**Location-Based Mobile Ordering Platform for Santa Fe Taguktukan**

A Capstone Project

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**CHAPTER I**

**INTRODUCTION**

**Background of the Study**

Over time, technology has grown more quickly. As technology advances, individuals must adapt to keep up with the quick changes. Technology is everywhere and has made many things possible that humans once thought impossible. This is because individuals become more knowledgeable about developments in computer technology, and their expectations and demands increase.

Many businesses use technology to improve customer experience, streamline operations and drive growth like the food industry. As technology and the internet have advanced in recent years, online ordering has become increasingly popular in the food industry. Customers can now buy food online and have it delivered right to their door more easily than ever due to the growing usage of mobile devices and the internet. Customers have the convenience of ordering food from the comfort of their homes or offices without having to go to the restaurant directly because of online ordering services. This is especially helpful for people who may not have the time or ability to visit the store in person due to hectic schedules or mobility challenges.

Online ordering allows customers to customize their orders, view menus, and track their deliveries easily. Save their favorite orders for future reference, making the process even more convenient. Online ordering is also beneficial for businesses, reducing errors and increasing efficiency. This saves time and money on staffing and training costs and allows stores to reach a wider audience, including those who prefer to order online.

Santa Fe Taguktukan is one of the popular food businesses that started in June 2020 in Batangas. They serve different variations of foods such as roasted chicken, sisig, liempo and crispy pata. As well as providing outstanding services to make a full satisfaction for every customer. The business is owned by Mr. Dante Gonda Jr and Mrs. Elena Gonda. All of the branches have approximately ten to fifteen (10-15) customers per day. The business has five branches which are in Bolo Bauan, Pandayan Bauan, Mabini, Libjo Batangas City and  Calicanto Batangas City. The Bolo Bauan and Mabini Batangas branches have two employees, while the other branches have one staff  member, in total of seven (7) employees.

The Santa Fe Taguktukan relied only on text messages/phone calls, manual transactions and manual record of inventory and sales. Businesses have a limited reach and could only be able to sell to people who physically visit them. They can lose out on potential clients who prefer the ease of online ordering as a result of this. Additionally, manual procedures might result in order mistakes and inefficient operations. Also, it might be difficult to keep track of how much of a specific item or product that is on hand while maintaining an inventory manually. This may result in overstocking or under stocking of products, which may lead to lost sales, decreased profitability, and dissatisfied consumers.

The researchers came up with the idea to develop a location-based mobile ordering platform that can provide many benefits to businesses, particularly those located in the Municipality of Mabini, where food delivery services may not be available.  This system can identify the customer's location and recommend nearby retail outlets for delivery or pick up. In this way, it can save time and reduce the difficulty of seeking food options in a new area.

Location-based mobile ordering platforms can offer personalized recommendations and promotions based on a customer's location and previous orders, making their experience more enjoyable. These platforms can also help businesses by reaching more customers and making the ordering process more efficient. A system that allows customers to order online using their devices can be helpful in making their ordering process more convenient and satisfying, which can lead to greater loyalty. Meanwhile, businesses can benefit from this system by using it to keep track of their inventory levels, sales, and receive notifications when stocks are running low. This allows them to manage their inventory better and prevent shortages.

Furthermore, the system can contribute to the achievement of sustainable development goals (SDGs) 9 - Industry, Innovation and Infrastructure. By facilitating access to information and communication technologies (ICTs) and promoting innovation in the business sector, a location-based mobile ordering platform can help achieve this goal. Businesses may enhance production, save expenses, and increase efficiency by using digital ordering procedures, which will boost their economy. This system can also enhance access to ICTs and help bridge the digital divide, especially for small businesses and those living in distant or underserved areas.

**Objectives of the Study**

The main objective of this study is to design and develop a location-based mobile ordering platform that enhances customer satisfaction and service management for Santa Fe Taguktukan.

Specifically, this study aims to:

1.      Design and develop a location-based mobile ordering platform that allows customers to easily place and track their orders on their mobile devices.

2.      Integrate a location-based service into the ordering platform that can direct customers to the nearest branch based on their current location.

3.      Increase customer satisfaction and loyalty by providing a consistent mobile ordering experience and personalized recommendations based on their order history.

**Significance of the study**

The researchers aim to improve customer service by developing a location-based mobile ordering system. The system may be useful to customers as well as business owners and staff of Santa Fe Taguktukan. The system may give owners and staff vital data on their business's performance, enabling them to make better decisions and run their operations more effectively while also increasing client satisfaction and improving inventory management.

For customers, the study aims to provide a convenient and efficient way of ordering.  This system cuts out time and effort, and can be particularly useful for customers who are impatient or have mobility problems. In addition, the system could provide customers with a more comfortable option during times of national health concern because this would not require face to face interaction. In particular, be able to significantly improve the business's performance and customer experience.

This study on a location-based mobile ordering platform can inspire future researchers in the fields of system development, e-commerce, and customer service. The study's findings can be utilized to enhance the design, functionality, and user experience of similar systems. Future research might investigate how these platforms affect different businesses and explore how they can implement new technology to improve their capabilities. This study serves as a starting point for further investigation and provides insight on how such technologies may change how businesses operate and how they interact with customers.

**Scope and limitation of the study**

The proposed location-based mobile ordering platform for Santa Fe Taguktukan aims to enhance customer service and streamline transactions. With this system, the end-users are the staff and customers. This system helps the customer to order from the nearest location for convenience. The business owner and staff are the web users while the customers are the mobile application users.

The system provides convenience by allowing customers to order food  easily from their mobile devices without having to physically visit the store. This reduces the time they have to wait and gives them a clear idea of what is happening with their order. The platform offers personalized recommendations based on the customer's location, preferences, and order history. The platform saves customers time by removing the need to stand in lines or call to place an order, making it quicker to get food. Additionally, during the pandemic, this platform is a safer option than traditional dine-in or take-out as it decreases the need for physical contact, reducing the chances of catching the virus. A location-based mobile ordering platform offers great benefits to customers, making it a popular option in today's world.

On the other hand, the business owner or staff can manage menus more orderly, reduce errors, and improve  the ordering process. The platform provides the staff with valuable insights into customer behavior, which can be used to make informed decisions about menu offerings, pricing, and marketing strategies.The platform can help the staff earn more money by simplifying the process of ordering and paying for food, as well as providing delivery services that attract more customers. Moreover, this platform can give the staff an edge over competitors in the competitive food delivery market by providing a more convenient and efficient ordering experience for customers.

The system is limited only to use traditional payment methods, because this platform does not support online payment options. This platform can work on different hardware and operating systems such as Windows, Linux, MacOS, Android, and iOS, and can also be accessed through web browsers like Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari. To use the platform, customers and staff need a strong Wi-Fi or cellular data connection, but as long as there is a reliable internet connection, the platform can be accessed on different hardware and operating systems.

Additionally, the system will only be available within the residential areas of all municipalities in each branch of Santa Fe Taguktukan in the province of Batangas. The business owner has expressed their willingness to hire staff for delivery once the location-based ordering system is implemented. Despite these limitations, the system can still significantly improve the effectiveness of Santa Fe's Taguktukan's operations by streamlining the ordering process and reducing the need for manual order-taking. Additionally, the system provides an additional channel for customers to place orders, which may help increase sales and customer satisfaction. In all, while the system has limitations, it can still provide benefits to Santa Fe Taguktukan and its customers.

**Definition of Terms**

To understand and clarify the terms used in the study, the following are hereby defined:

**Android .** A mobile operating system that Google has created. In this study, Android devices are being used by customers to access and place orders through the location-based mobile ordering platform that the researchers are developing for Santa Fe Taguktukan business. Customers can place orders for food items using their Android devices, and the ordering platform is likely designed to be responsive and optimized for use on various devices, including Android smartphones and tablets.

**Interface.** A user experience design that was built to make the system’s interface easy to use. The term "interface" in this study refers to the user interface of the location-based mobile ordering platform that the researchers are developing for Santa Fe Taguktukan business. The interface is the visual representation of the system that customers and business owners interact with to place orders, manage inventory, and track sales.

**Location-based Services.**  Technologies that use a mobile device's location data to provide information or services relevant to the user's physical location. LBS typically rely on global positioning systems (GPS) or wireless networks to determine a user's location. In this study, location-based services provide customers with location-specific information, such as branch locations, delivery options, and estimated delivery times.

**Mobile Application**. It is a software application specifically designed to run on mobile devices such as smartphones and tablets. In this study, the developers will create a mobile application for the proposed system that will be used by customers of Santa Fe Taguktukan.

**Santa Fe Taguktukan.** One of the  popular food businesses in the province of Batangas and the client of this study.

**Staff.** It is a group of people who work for an organization, company, or institution. The staff of Santa Fe Taguktukan who will be the one that manage the orders of the customers in the system

**Web Application.** Is a software application that is accessed and used through a web browser over the internet. In this study, the developers will create a web application for the proposed system that will use the staff of Santa Fe Taguktukan.

**Chapter II**

**REVIEW OF RELATED STUDIES AND SYSTEM**

         In this chapter, the researchers primarily present the different research and literature from both foreign and local researchers, which are related to the study.

**Technical Background**

         The researchers determine specifically what technical tools and technologies will be employed throughout the system's development. The system in this paper is a location-based mobile ordering platform that enables the business to satisfy its customers while enhancing its own productivity. Customers can simply view and access the system’s dashboard and allow them to locate their location based on the nearest location branch.

**Visual Studio Code (Vs Code)**

         Visual Studio Code (VS Code) is often employed in a variety of programming languages, including Python, Java, C++, HTML, CSS, and JavaScript, and more. This platform can perform multiple programming tasks in various platforms such as Windows, macOS, and Linux. For the development of computer programs, websites, web applications, and web services, Visual Studio is a flexible software tool. (Cangemi, 2020).

         The researchers that are working to create the graphical user interface for their suggested system may find this wide language support useful. Source control integration, debugging tools, and code navigation tools are a few characteristics that are commonly present in an IDE. Furthermore, the programmer connects Git to incorporate tools for managing code repositories and tracking changes.

**HTML (Hypertext Markup Language)**

HTML utilized to create content and structure of web pages. Most HTML documents consist of several types of nested tags that specify the different page elements, including headings, paragraphs, images, and links. Develop comprehensive and interactive web apps by combining HTML with additional web technologies like CSS and JavaScript. JavaScript is used to bring dynamic functionality and responsiveness to the page, whereas CSS is used to style and format the webpage's content and layout. The basis of modern web technology is the combined application of HTML, CSS, and JavaScript. Creating a web page using HTML is significant for testing the page to ensure that it is compatible with various web browsers and devices. This involves using browser developer tools and testing tools to check for any errors or compatibility issues.

**CSS (Cascading Style Sheets)**

 CSS is a language specifically designed for creating stylesheets used in describing how HTML documents should be presented and arranged. It is used by web developers to separate the content and structure of a webpage from its visual presentation, thereby simplifying its maintenance and updating. To apply styles to HTML elements, CSS uses a syntax that involves selecting specific elements and specifying desired properties such as margin, padding, color, font size, and positioning. CSS also includes more advanced features such as animations, transitions, and responsive design techniques. CSS follows a cascading approach, where styles are applied to elements in a hierarchical order from more general to specific selectors. In this way, styles applied to parent elements can be inherited by their child elements, unless overridden by more specific selectors. Classes and IDs can also be used to apply styles to multiple elements at once. CSS has evolved to include new features such as CSS Grid and custom properties. CSS Grid allows for advanced layout techniques, while custom properties enable developers to create reusable variables in their CSS. These advancements have made CSS an even more powerful tool for creating dynamic and responsive web designs. (Morris, 2012)

**Vite**

Vite is a next-generation front end build tool created by Evan You of Vue.js fame that aims to provide an extremely fast development experience for modern web apps. It achieves this by serving source code over native ES Modules during development rather than bundling modules like traditional build tools, allowing for lightning-fast Hot Module Replacement. Vite handles compatibility via on-the-fly transpiling and only pre-bundles for production. Additional optimizations like esbuild pre-bundling, gzipping, and on-demand compilation enable nearly instant server start and rebuild speeds. Vite supports many frameworks like React, Vue, Preact and Svelte out of the box with dedicated plugin integrations. The goal of Vite is to provide an experience as close as possible to pure ES Module imports while generating highly optimized bundles for production. With its innovative approach and impressive performance, Vite represents a huge leap forward compared to bundlers like Webpack and is quickly being adopted for building modern web apps.

**ReactJS**

ReactJS is an open-source JavaScript library created by Facebook for building interactive user interfaces and web applications. It follows a component-based approach where UI is split into reusable components that manage their own state and render independently. React utilizes a virtual DOM that batches updates for better performance and enables declarative programming via JSX syntax. Key features include one-way data binding, an efficient diffing algorithm, reusable components with lifecycle methods, and a large ecosystem of third-party libraries. React promotes modular, performant code organized around a unidirectional data flow. It has a steep learning curve but offers great power and flexibility. React is used by companies like Netflix, Airbnb, and Instagram to build complex, large-scale web apps. Its growing popularity and industry adoption makes React a highly valuable skill for modern web development.

**Tailwind CSS**

Tailwind CSS is a highly customizable, low-level CSS framework that takes a utility-first approach for building custom user interfaces rapidly. It provides a set of atomic CSS classes for margin, padding, color, flexbox and many other common styles that can be composed to design UI components. Tailwind avoids opinionated pre-designed widgets, focusing instead on maximum flexibility. It has predictable class names generated based on a config file that allows customizing colors, sizes, variants and more. Tailwind enables rapid development by reducing the need to context-switch between HTML and CSS. Its "mobile-first" philosophy, just-in-time compiler, and purging unused styles optimize performance. With its flexibility, customization, speed, and simplicity, Tailwind CSS has become a popular choice for rapidly building modern web applications.

**Font Awesome Icons**

Font Awesome is a popular icon set and toolkit originally developed by Dave Gandy for use with Bootstrap CSS framework. It contains over 1,500 free icons that cover a diverse range of topics and object categories, making it a versatile icon library for websites and apps. Icons are scalable vector graphics implemented as fonts, allowing easy styling and coloring via CSS. Font Awesome supports icon stacking and mixing to create more complex icon imagery. It has a solid icon naming scheme along with an official CDN for easy inclusion on projects. Font Awesome provides CSS, LESS, SCSS, SVG, webfonts, and React versions for broad compatibility. Expanding far beyond its Bootstrap roots, Font Awesome has become a widely used, flexible and powerful icon solution for any project needing great-looking iconography and symbols. Its strong popularity is driven by its free availability, diverse icon set, and ease of implementation on the web.

**React Tanstack Table**

React Tanstack Table is a lightweight and extensible data grid component for React built on top of Tanstack Query. It provides an accessible foundation to display tabular data with features like sorting, filtering, pagination and row selection while remaining customizable and framework-agnostic. The headless architecture allows columns, rows and cells to be freely composed using React components and CSS. It ships with a set of plugins that add more advanced functionality like grouping, aggregation and state persistence. Tanstack Table promotes manipulating data through queries rather than transforming it, enabling performant rendering and virtualization for large data sets. With its simple API, impressive flexibility and small footprint, Tanstack Table is positioning itself as a popular alternative to solutions like react-table for building fast, functional tables and data grids in React applications.

**Google Font**

Google Fonts is a free library of open source fonts that can be easily integrated for use on websites via the Google Developers Fonts API or CSS @import. It offers over 1000 font families supporting multiple styles and weights, with expanded languages and scripts. The fonts are optimized for fast web loading across devices and can be customized with advanced features like variable fonts. Google Fonts covers a diverse catalog of fonts including serif, sans-serif, display, handwriting and more styles suitable for headers, text, and accents. It aims to make beautiful typography accessible for all developers and designers. With reliable performance, extensive choice, and simple implementation, Google Fonts has become the standard free font resource for creating visually engaging web content. Its popularity is driven by Google's trusted hosting and maintenance of open source fonts for easy web integration.

**Postgresql**

PostgreSQL is a powerful open-source relational database management system emphasizing extensibility and technical standards compliance. It supports a large part of the SQL standard and offers many modern features including complex queries, foreign keys, triggers, views, transactional integrity, and multi-version concurrency control. Highly extensible, PostgreSQL can be augmented with new data types, functions, operators, indexes, aggregates etc. It uses multi-version concurrency control for maintaining data integrity in concurrent environments. PostgreSQL is highly scalable both in data size and users, proven to handle heavy workloads for enterprise apps. It has a strong reputation for reliability, stability and robust feature set making PostgreSQL a popular choice for many small and large projects. An active open-source community contributes to PostgreSQL's vibrant ecosystem of tools and libraries that enhance its functionality, performance and security.

**Express.js**

Express.js is a lightweight and flexible web application framework for Node.js for building web APIs and applications. It provides a robust set of features for building single and multi-page applications and services with Node.js. Express promotes code organization with the MVC pattern and provides a thin layer on top of Node's HTTP server functionality. It offers easy routing, middleware, template engine support, error handling, and a host of third party libraries to simplify common web development tasks. Highly scalable and performant, Express forms the basis of many popular Node.js web frameworks. It has become the de facto standard server framework for Node.js with a strong community backing and countless modules available. Express enables rapid development and makes it easy to organize and structure Node.js code into RESTful APIs and web apps by abstracting away much of the boilerplate at a fundamental level.

**SQL**

SQL (Structured Query Language) is the standard language designed for managing data in relational database management systems. It allows for declarative access and manipulation of data including creation, insertion, querying, updating and deletion of records in a database. SQL commands are used to retrieve and edit database information like creating tables, adding rows, modifying data, joining tables, grouping and filtering results etc. It uses relational algebra and tuple relational calculus as a theoretical basis for its query language semantics. SQL became an ISO standard in 1987 and has undergone several revisions since while remaining the most widely used database language. Its simplicity and expressiveness has led to widespread adoption with support for SQL or SQL-like variants across most database systems like Oracle, MySQL, Microsoft SQL Server, and PostgreSQL. SQL forms the foundation for database interactions in applications.

**Json Web Token**

JSON Web Token (JWT) is an open standard that defines a compact, self-contained way for securely transmitting information between parties as a JSON object. It is used for representing claims to be transferred between two parties. JWTs can be signed using a secret or public/private key pair for verification purposes. Signed tokens can verify the integrity of the claims contained within it. JWTs are often used for authorization and information exchange in security sensitive applications. They are simple, well-supported across languages, and ideal for scalable, decoupled systems. JWTs contain a header, payload and signature and can be encrypted if needed. They are commonly used for authentication, session management and exchanging information in modern applications and APIs. JWT provides a standardized way to deal with tokens securely in the web ecosystem.

**Bcrypt**

Bcrypt is an adaptive password hashing function designed for securely storing passwords. It utilizes a key derivation procedure that applies a salt and then invokes a reversible Cipher Block Chaining hash with an adjustable work factor to slowly generate a password hash. The work factor can be increased over time to make password cracking harder as computational power grows. Bcrypt generates unique hashes due to its salting and is resilient to GPU, FPGA and ASIC hardware acceleration attacks. It produces hashes with fixed 60 character length using the modified Base64 algorithm making it simple to incorporate the hashes into existing systems. Bcrypt is available across many platforms and languages with widespread adoption. It remains one of the most robust password hashing algorithms, providing a great way to safely handle and store user passwords with minimal overhead.

**React-Leaflet**

React-Leaflet is the most popular open source library for integrating Leaflet maps into React applications. It provides React components like Map, Marker, Popup and GeoJSON that wrap Leaflet functionality for use in React's declarative style. React-Leaflet allows easily creating maps, bindings, controls and layers leveraging the robust mapping features of Leaflet. It promotes composable and reusable map components that can be shared across projects. React-Leaflet supports two-way data binding and events to make it simple to connect UI and map interaction. Features like zoom, pan, layers, geo-location and custom map controls can be added using declarative components. Built with performance in mind, React-Leaflet takes advantage of efficient React rendering and Leaflet's use of canvas instead of SVG. With its React integration, active community and simplicity, React-Leaflet has become a ubiquitous choice for adding interactive maps to React web apps.

As stated by Shahare & Burghate (2021), the rise of the Internet has been a game-changer for the e-commerce industry, and the recent improvements in Internet technology have only accelerated this growth. One of the fastest-growing sectors in e-commerce is online food ordering, which allows customers to order food from their favorite restaurants via the restaurant's website or mobile app. This form of e-commerce has become increasingly popular because it is convenient and easy to use. With online food ordering, customers can order food from the comfort of their own homes and have it delivered straight to their doorstep, making it an ideal option for people who want to enjoy restaurant-quality food without the hassle of leaving their houses.

Another study by Vasic et al., (2019), with the advent of technological innovations, the traditional mode of purchasing goods and services has become outdated for some consumers. The convenience, speed, and accessibility of the Internet have fundamentally transformed the way people shop and their expectations of the shopping experience. This shift in consumer behavior has compelled vendors to rethink their approach to creating value for customers and building strong relationships with them. To cater to the changing needs and preferences of consumers, vendors have leveraged technology to offer personalized experiences and create a seamless shopping journey. In doing so, vendors have not only been able to meet consumer expectations but also build brand loyalty and long-lasting relationships with customers.

Based on the study of Pal et al., (2022), the coronavirus (COVID-19) pandemic has had a significant impact on the food industry, with many restaurants being forced to shut down or reduce their seating capacity to comply with social distancing guidelines. As a result, the use of online food delivery (OFD) services has surged during the pandemic. To avoid the risk of getting infected with the virus, customers now prefer to order food through online applications and trusted providers rather than directly visiting the restaurant. This has led to a significant shift in consumer behavior, with more people relying on online food delivery services as a safer and more convenient option. As the pandemic continues, the trend of online food delivery is expected to persist, and businesses in the food industry must adapt to this shift in order to stay competitive and meet the changing needs of their customers.

Online food ordering is a popular service offered in e-commerce, where customers can access interactive menus of meals offered by a shop or restaurant and place orders through a website. This service can be accessed via personal computers or mobile phones with an internet connection. To facilitate easy ordering, customers can create user accounts on the website where their personal details are stored for future reference. The customer can select from a list of available foods and place an order for the chosen food. This service has gained popularity due to its convenience, time-saving nature, and contactless nature, especially in the wake of the COVID-19 pandemic (Manju, 2019).

In today's world, the use of mobile devices with wireless technology has become ubiquitous in the tourism industry, particularly in restaurants with the rise of food order systems. The quality of a restaurant's website plays a significant role in building customer trust and satisfaction. A well-designed website that is easy to navigate and provides accurate information about the restaurant's menu, prices, and delivery options can greatly enhance the customer experience. Additionally, there is a strong correlation between the quality of service provided and customer satisfaction. When customers receive timely and efficient service, it increases their level of satisfaction and trust in the restaurant. Furthermore, studies have found that there is a positive correlation between website trust and customer satisfaction, as well as between customer satisfaction and trust. This highlights the importance of providing a seamless experience across all touchpoints, including website design, service quality, and customer satisfaction (Sarve et al., 2021).

In another study by Hatim et al., (2019) , mobile devices have emerged in the hospitality industry especially restaurants with the advancements in food ordering systems. Most restaurants use a manual ordering process involving pen and paper in which noting down the orders can be quite slow and can cause errors in noting down the customers’ orders. Based on QSR statistics, young generations usually order food online which caused the online ordering traffic to grow 300% faster than dine-in traffic. Moreover, most people preferred to use the online ordering system as it is more convenient and reduces their waiting time.

Another study defined the online ordering system as a simple and convenient way for customers to purchase food online without wasting time in restaurants. This system enables the customer to order the food with the help of a website or application, then have the food delivered to their doorstep, and payments can be made online through debit cards, credit cards, etc. This method is convenient, safe, and reliable, and it is revolutionizing the present restaurant industry(Krishna, 2019).

Furthermore, according to the study by Idris et al., (2021), online food ordering and delivery services have emerged as a convenient way for consumers to order and purchase food products from restaurants or food service operators. These platforms offer a seamless user experience, allowing customers to browse menus, place orders, and track deliveries in real time. This trend has gained significant popularity among Millennials, who value convenience and quick access to services. Online food ordering and delivery services have revolutionized the food industry, making it easier for consumers to access a wide range of food options from their favorite restaurants, without having to leave their homes. This has led to the growth of several online food delivery platforms, creating a competitive market for vendors to offer better services, faster deliveries, and improved customer experiences.

The online food delivery industry has emerged as a new channel of food delivery and marketing, offering restaurants the opportunity to capture a bigger share of the food industry's sales. According to Yusra & Agus (2020), the growth of online food delivery services has been driven by the rise of technology and the convenience it offers consumers. With the availability of mobile apps and online platforms, customers can easily browse menus, place orders, and track deliveries in real time, making it a convenient and hassle-free experience.

Moreover, online food delivery services have also become a popular marketing tool for restaurants to promote their offerings and reach new customers. Through online promotions and partnerships with food delivery platforms, restaurants can increase their visibility and attract a larger customer base. As such, the online food delivery industry has become an important component of the food industry's growth and success, providing a platform for restaurants to compete and thrive in the modern marketplace.

The advancement of online food ordering systems has caused a major shift in restaurant culture, bringing an unparalleled level of convenience to people all around the world. According to the study by Gupta (2019), the development of technically advanced online food ordering systems has created a new and exciting comfort zone for customers. The popularity of smartphones and the widespread availability of the Internet have made the online ordering and food delivery services an increasingly popular trend in modern society. As stated by Tan and Eng Kim (2021), this trend has given rise to a multi-billion-dollar industry that has transformed the way people order food and enjoy dining experiences. With the ability to order food online and have it delivered directly to their doorstep, customers can now enjoy restaurant-quality meals in the comfort of their own homes without having to worry about the hassle of going out to eat. This shift towards online food ordering has not only changed the way people dine but has also created new opportunities for businesses to grow and expand in the digital age.

The study conducted by Farah et al. (2022) has highlighted a significant rise in the number of online food ordering and delivery companies within the food and beverage (F&B) sector. The study also notes that emerging markets are witnessing a shift from traditional methods of ordering food over the phone to placing orders online. This shift in behavior has several implications for both customers and restaurants. Customers now have more control over their purchase decisions and can easily browse menus, customize orders, and track deliveries through their smartphones.

On the other hand, restaurants must adapt to the changes and develop efficient systems and processes to meet the demands of online ordering and delivery. Ordering food online has created a strong reflection in people’s mind and multiple factors are attracted which includes purchase power of the people, awareness about upcoming trends, various payment options, widespread internet access, and offers and discount provided by the companies (Katrodia, 2020).

The study by Chai and Yat (2019) examines the reasons behind the rise of online food delivery services. The authors argue that urbanization has led to changes in consumer behavior, with busy urbanites seeking convenience and value for money. Online food delivery services have emerged as a solution to this problem, offering a wide variety of food options that can be ordered and delivered quickly and easily. The study also highlights the role of technology in driving the growth of these services, with mobile devices and the internet making it possible for consumers to order food from anywhere at any time. By understanding these factors, businesses and policymakers can better respond to the needs of urban consumers and continue to drive innovation in the food delivery industry.

According to the study of Li et al., (2020), Online food delivery (OFD) requires efficient and scalable real-time delivery services to meet the demands of customers, who expect quick and reliable delivery of their food. Restaurants have several options for fulfilling their delivery needs, including using existing staff for self-delivery, hiring specialized delivery teams, or employing crowdsourcing logistics. Self-delivery can work for smaller restaurants that have waiters who can also perform delivery tasks, while larger restaurant brands such as KFC, Domino's, and Xibei often use specialized delivery teams that are specifically trained for the task. Crowdsourcing logistics, on the other hand, involves utilizing a network of independent contractors who provide a low-cost and efficient approach to food delivery. Regardless of the approach taken, efficient and scalable delivery services are essential for the success of online food delivery.

Customers now have more choice and convenience when ordering food thanks to online food-delivery aggregators (OFAs). Customers can place orders for food from a variety of restaurants with just one swipe on their cellphones thanks to these platforms, which eliminates the need to search for each restaurant separately. Customers may choose their favorite restaurant and menu items with the use of a variety of tools offered by OFAs, such as real-time delivery tracking and user ratings and reviews. Customers are increasingly opting to buy food online rather than going to restaurants in person, which has led to an increase in demand for online food delivery services. Additionally, OFAs have also provided a platform for small and independent restaurants to reach a wider audience, boosting their visibility and sales (Kapoor & Vij, 2020).

In the study by Rathore & Chaudhary (2018), Online food ordering services have created a competitive market for restaurants, allowing them to expand their customer base and increase their revenue. With the rise of online food delivery services, restaurants are now able to reach a wider audience beyond their physical location. Moreover, online food ordering has provided a convenient platform for small-scale food businesses to sell their products, which was previously not possible due to the high cost of establishing and maintaining a physical store. The ease of use and convenience of online food ordering systems have made them a popular choice for customers and businesses alike, and they are expected to continue to grow in popularity in India as more people embrace the benefits of online shopping and delivery.

In another study by Saad (2021), online food ordering has emerged as a significant sector globally and has recently gained popularity in Bangladesh. With the increasing availability of the internet and busy lifestyles, online food delivery services have become a necessity for consumers. As a result, businesses have responded to this need by offering convenient and efficient online ordering and delivery services. Understanding the consumer landscape is critical to realizing the full potential of the e-commerce platform, as it has the potential to influence the economy, businesses, and the quality of life for people. By leveraging technology, online food ordering systems have the potential to create new opportunities for businesses and entrepreneurs, boost employment, and contribute to the growth of the economy. It also offers convenience and a better quality of life for consumers who can order food from the comfort of their homes. As online food ordering continues to grow in Bangladesh, businesses need to keep up with changing consumer needs and preferences to remain competitive in the market.

Based on the study by Sugirtham (2021) it highlights the fact that rural customers are also satisfied with using online food ordering. The study suggests that the success of online food ordering can be attributed to several key features, including the brightness of the website, the availability of facilities, the comfort of the online experience, and the user-friendliness of the website/app. These features have contributed to the overall success of online food ordering and have helped to attract and retain customers from both urban and rural areas. The findings of the study indicate that the benefits of online food ordering are not limited to urban areas alone and that businesses operating in this space should consider tailoring their services to meet the needs and preferences of rural customers as well. By doing so, businesses can tap into a potentially significant market and expand their customer base. The study underscores the importance of understanding the needs and preferences of customers from different regions and demographics and suggests that businesses that are able to do so will be well-positioned to succeed in the online food ordering space.

In the conducted study by Shipman (2020), The satisfaction of customers with online food ordering services is influenced by various factors, including website quality, delivery, and food quality. The quality of the website, including ease of use, navigation, and design, plays a crucial role in shaping the customers' experience and satisfaction with the service. The quality of delivery, including timeliness and accuracy, is also an important determinant of customer satisfaction, as it ensures that the food reaches the customers on time and in good condition. Furthermore, the quality of the food is another important factor that shapes customer satisfaction. The taste, freshness, and presentation of the food are crucial in determining whether customers will be satisfied with their order. It has been observed that customer satisfaction with these factors positively affects future behavioral intentions, such as repeat purchases and word-of-mouth recommendations. Therefore, online food ordering services need to focus on improving website quality, delivery, and food quality to ensure customer satisfaction and build long-term loyalty.

**Related Studies (Local) 10 –**

**Related Systems**

A system developed by Gurav et al., (2021), the Online Food Ordering App is a user-friendly application designed specifically for the food delivery industry. Its purpose is to help hotels and restaurants expand their businesses while reducing labor costs. With this app, establishments can easily manage their online menu, which customers can browse and use to conveniently place orders with just a few clicks. Admin employees can then efficiently process these orders through a simple and easy-to-use graphical interface. This system brings convenience to customers by providing an online platform for ordering food, resulting in increased takeaway orders compared to in-person visits. By setting up an online menu, tracking orders becomes effortless, maintaining a customer database becomes more organized, and overall food delivery service can be improved. Additionally, this system ensures user privacy by assigning a unique account with an ID and password for each individual, making the ordering process more secure.

Another related system by Dhiman (2021), The online food ordering management system makes ordering food much simpler. It has a user-friendly interface that shows all the available options on the menu, making it easier for customers to choose what they want. They can order any item they like and even adjust the quantity. Once the order is confirmed, it is displayed on the homepage of the website. The order is then added to a queue and updated in both the database and the admin panel in real time. This system helps the staff by allowing them to check and process orders quickly and easily, with fewer errors.

The Food Ordering Online System was developed to address the needs of people who cannot personally go out to buy food, either due to lack of transportation or time constraints. It is a website specifically designed to help individuals order halal cuisine from JomMakan restaurants in Setiawangsa, Kuala Lumpur. The development process followed a prototyping-based technique, resulting in a two-phase prototype that eventually evolved into a fully functional web-based platform. HTML, CSS, and PHP were utilized in creating this website. The project adopted a prototype approach, involving stages such as initial planning, prototype creation, customer validation, iterative improvements, and website launch. This system offers an efficient alternative to dining in a restaurant, saving time, reducing errors, and providing high-quality customer service (Azahari et al., 2022).

Based on the system developed by Swathi & Durga (2020), the online canteen food ordering system project aims to address these challenges by allowing users to pre-book their meals. Once an order is placed, it is immediately sent to the chef for preparation. Unlike the existing manual system that involves paperwork and file maintenance, the proposed system offers online payment options and provides users with an electronic menu to choose from. Users can access the system using their unique username and password. This project showcases the transition from traditional methods to an efficient online environment, bringing together all the necessary features for the benefit of both users and canteen owners.

Another related system by Abhang (2021), the Pizza Ordering System is designed to handle the management of payment details, customer information, pizza options, and order statuses. This project primarily focuses on the administrative aspect, providing access exclusively to the administrator. The goal is to create a software application that reduces the need for manual work when it comes to managing payments, customers, and online orders. The system effectively keeps track of all the relevant details concerning pizzas and order statuses. By automating the existing manual system through computerized equipment and software, the Pizza Ordering System aims to store valuable data and information for extended periods, allowing for easy access and manipulation of the data. The necessary software and hardware for implementing this system are readily available and user-friendly.

The staff and students at Asia Pacific University of Innovation & Technology (APU) often find it difficult to have meals on time because of their busy schedules and deadlines. To address this issue, APU introduces an online canteen ordering system that allows cashless payments (Imam et al., 2021). Instead of physically going to the canteen, the staff and students can use their existing cashless payment cards to order and pay for their meals through the system. This provides them with a more convenient way to get their meals and promotes healthier eating habits on campus. The system takes inspiration from popular food ordering apps like Grab Food but is customized specifically for APU. Users can easily track, order, and pay for their meals using the system, while stall operators can manage their menus, update order statuses, and keep track of all the orders they receive. It's a win-win situation as it provides a new income stream for the stall operators and improves the overall dining experience for the university community.

In the system by Sriram (2020), the Catering Service for Food, also known as the Online Cafe (OC), is a software that allows customers to order food online. The main goal of this project is to provide a smart and efficient service to the users. It is a web-based application built using JAVA, with an easy-to-use interface for customers to browse the menu and place their orders online. The shop owners can add a wide variety of products to the system and categorize them as per their preferences. They can manage orders and process payments as well. Customers can choose their desired items, select their preferred payment method, and then wait for the delivery of their food. The OC system handles all the information related to different types of orders and offers a complete solution for online food ordering. With this new approach, all the necessary information can be accessed with just a single click. The study focuses on developing a web application using JAVA for online food ordering, which also allows restaurant owners to update their menus. Effective connectivity between the front-end (shopkeepers and customers) and the back-end (admin) is established using JAVA database connectivity with MySQL.

A system developed by AL-seaghi & Ghazali (2022), the Online Reservation and Food Ordering System are designed to make the process of reserving a table and ordering food much simpler for both customers and restaurants. In the past, many people faced disappointment when their preferred restaurants were fully booked, and they had to change their plans. However, this website provides an interactive and regularly updated schedule, displaying all available options in an easy-to-understand way. Customers can easily select the type of reservation and the food they want, helping them choose a suitable day and time to make their reservation or order. This streamlined process allows restaurant staff to efficiently manage reservations and orders, serving customers effectively with minimal time and effort. The system was developed using PHP and HTML programming, utilizing prototype models for iterative development in the analysis, design, and implementation phases. Testing of system modules will be conducted to ensure reliability and make any necessary adjustments. The system not only makes it easy for customers to make reservations and orders by providing their information and selecting a suitable time, but it also helps manage the restaurant's schedule by limiting the number of customers per day to avoid overcrowding. Additionally, the website provides important information and location details about the restaurant for customers' convenience.

In another related system by Priyambodo & Hindarto (2021), the online food ordering application for stalls, the number of people waiting in queues can be limited to prevent overcrowding. The development of this application has been done effectively using HTML, PHP programming languages, and the Bootstrap framework, which ensures a visually appealing interface that works well on both desktop and mobile devices. The application utilizes a database managed by XAMPP software, using the SQL framework, to store and organize data. This ordering application significantly reduces the time spent by customers at the stall, as their orders are prepared in advance. Furthermore, the application also provides useful information about the stall's offerings, enhancing the overall experience for both customers and stall owners.

An online Food Ordering System is being suggested to make ordering food much easier (J. Sriram & Akilan, 2022). The system will have a user-friendly interface that displays an updated menu with all the available options, making it convenient for customers to select their desired items. Customers can add multiple items to their order and review the details before finalizing it. Once the order is placed, it will be added to a queue and updated in the database, providing real-time information. The main goal of this project is to establish partnerships with local restaurants and bring them together in one organized system. This will benefit both customers, who can easily order from multiple vendors, and the restaurants themselves, who can reach a wider customer base.

The online food ordering system offers great convenience to customers, overcoming the drawbacks of traditional queuing systems. It allows for a faster and more standardized process of taking customer orders, improving overall efficiency. The system also provides a better communication platform, as customer details are recorded electronically. With an online menu, customers can easily browse and select their desired food items with just a few clicks. Additionally, the system enables order tracking, maintains a customer database, and enhances food delivery services. Payment can be made online or through a pay-on-delivery option, ensuring flexibility for customers. To protect user privacy, the system assigns a separate account with a unique ID and password for each user, ensuring secure and confidential ordering (Ms. Meenu Garg and Dr. Bhoomi Gupta, 2020).

The proposed system by Shah et al. (2021), provides users with the convenience of accessing local vendors online, especially during challenging times like the COVID-19 pandemic. This system benefits both customers and local vendors by offering an app-based platform where customers can purchase products from their local vendors. Previously, customers had to physically visit nearby stores to buy their items, without any online food ordering or delivery options. The researchers recognized this need and developed a system that connects users to local stores through our service. It caters to people who are unable to cook, have busy days, or simply prefer ordering food online. The service providers, including hawkers, grocery stores, restaurants, and tiffin services, can register on our platform to gain access to our service. Customers can select the store they want to order from, browse through the menu, and place their orders. The system also provides live tracking of orders, and payment can be made either through cash on delivery or online payment methods. The owners of the stores can accept requests based on the availability of food items. This system aims to bridge the gap between customers and local vendors, providing a convenient and efficient way to support local businesses.

The Food Finder is an online food ordering system that addresses various issues faced by the food industry (Rathod et al., 2018). These issues include long queues during peak hours, mistakes in order taking, an increase in takeaway orders compared to dine-in customers, the need for faster food preparation, limited promotion and advertising, and challenges in maintaining food quality. This application offers a wide range of food options available for users to purchase online. It also provides a convenient way for restaurants to manage their online menus, allowing customers to easily browse and select their desired items. Additionally, the system enables efficient order tracking and dispatching for timely food delivery. With a user-friendly interface, customers can search for specific food menus and view the exact price of selected items before placing their final order. The Food Finder aims to enhance the overall experience of food ordering, addressing common industry challenges and providing a seamless online solution for customers and restaurant owners.

University canteens often face a common problem of overcrowding during lunch hours, leading to inefficiency and long waiting times. To address this issue, a platform called "Smart Canteen" has been developed, which incorporates an online food ordering system and a virtual queuing system (Krishnan & Anees, 2021). This platform also streamlines the payment process by utilizing the Unified Payment Interface (UPI). Additionally, another significant challenge faced by canteens is the wastage of food and inadequate supply. To combat this, machine learning techniques are employed to analyze ordering and collection data, enabling canteen administrators to predict the food requirements for the following day. This helps reduce food wastage and ensures a supply that meets the demand. With an improved administration dashboard and the utilization of this software, the Smart Canteen platform takes university canteen management to the next level, improving efficiency and enhancing the overall experience for both staff and students.

A system developed by Et. al. (2021), The Online Table Reservation System is a web-based solution designed to simplify the process of reserving tables at restaurants, along with offering the option of pre-ordering food and allocating parking spots. This system aims to streamline the operations of restaurants, allowing them to expand their business and save time by managing table reservations in advance. Additionally, the system provides a user-friendly interface for customers to easily browse through an online menu and place orders with just a few clicks. The system also incorporates personalized recommendations based on the user's preferences and previous food selections, suggesting popular dishes and related items. Furthermore, the system ensures a seamless experience by reserving both a table and a parking space within the appropriate time slot, minimizing any inconveniences for users. With the possibility of developing a smartphone-compatible application, this system offers a convenient and efficient way for customers to reserve tables, pre-order meals, and manage parking arrangements.

Another related system by Novitasari & Wijaya (2021), PT Media Langit Persada is a digital printing company that currently relies on manual ordering processes. Customers need to physically visit the printing house to place their orders, and the management division collects data manually. However, this approach is not efficient and may lead to errors in data storage and customer information. To address this, the company is undertaking a study to develop a web-based ordering system. The goal is to make it easier for customers to place orders online, while also simplifying the company's overall business processes. The system will be tested using the Technology Acceptance Model (TAM) method, which involves gathering feedback from potential users through questionnaires. This will help determine if the system is suitable for implementation and whether it will be accepted by the community. The aim is to improve efficiency, accuracy, and customer satisfaction by transitioning to an automated and user-friendly online ordering system.

Additionally, a system by Pathare et al. (2020), online food ordering system is designed to provide convenience for customers when ordering food. It is a website or platform specifically developed for the food delivery industry. This system enables hotels and restaurants to expand their business by reducing labor costs. It also facilitates the management of an online menu, which customers can easily browse and use to place orders with just a few clicks. With our proposed system, customers can order food online hassle-free from various restaurants and food outlets. The system includes features such as order tracking, allowing customers to monitor the progress of their orders. Customers can provide feedback and rate the food items through the system's feedback system. Initially, the system supports cash-on-delivery as the payment method. This review aims to analyze the global and Indian market scenario of online food delivery systems, including the major players, key growth factors, and the advantages and disadvantages of such systems.

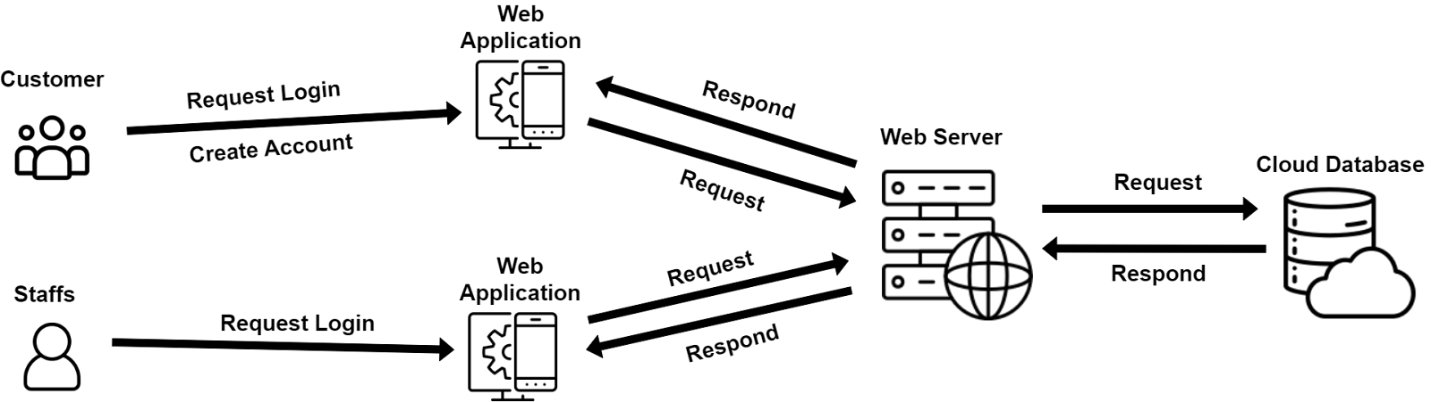
The Smart Canteen project introduces a convenient method for ordering food online, suitable for any canteen industry (Nikhil, 2022). This approach offers numerous advantages for both customers and canteen staff. When using the ordering application, customers are presented with an interactive menu that is regularly updated and showcases all available food options. The prices displayed are dynamically adjusted based on the selected choices. Customers can easily add items to their order and review all the details before finalizing the transaction through the Android app. This system greatly streamlines the canteen's operations and automates the order reception process. Once a customer's order is confirmed, it is immediately updated in the server's database and can be retrieved by the canteen staff using their own Android application. The application provides a clear overview of all items in the order, along with relevant options and delivery details in a concise and user-friendly manner. Canteen staff can efficiently process the order as soon as it is placed and easily track records if necessary.

In the system by Sayali Shahaji et al. (2020), the Mess food delivery system offers a convenient and user-friendly platform for ordering our favorite food. With a multi-vendor system, we have the flexibility to choose the vendor of our choice and explore their menu options. After selecting the desired food items, we can easily place the order and proceed to payment. This system saves us the time and effort of waiting at the vendor's location, as we can order the food in advance through the app. This online food delivery service aims to make good food easily accessible, ensuring it is delivered to our doorstep. By increasing the takeaway options, this system improves the efficiency and standardization of the ordering process, providing a seamless communication platform between customers and vendors.

Another system by Mishra et al. (2018), an ordering system along with robotic waiters in restaurants in India brings a new and innovative approach to dining. This web-based application can be accessed by customers on their smartphones, allowing them to conveniently place their orders. The system aims to benefit restaurants and hotels by enhancing their star rating and reducing human errors that can occur during the order-taking process. With the growing competition in the hospitality industry, many hotels are exploring new ways to attract customers and stand out from the crowd. By embracing technology and registering on online applications, restaurants can automate their operations and create a unique dining experience with the assistance of robotic waiters.

**Conceptual Framework**

In this chapter, the researchers highlight the significance of conceptual framework. All the tools and information required for the project's development are shown in Figure 1. It also indicates the specific processes for which these technologies will be used. This illustration provides a key concept related to the platform's development and use. The diagrams and labels in the illustration most likely describe the uses of each tool and the information required for each procedure. It may be simpler for stakeholders and team members to understand the complexity of the project and make sure that all relevant components are utilized into account by providing this information in an illustration design to successfully accomplish the Location-based Mobile Ordering Platform.



**Figure 1.** **Conceptual Framework**

The figure shows the Customer and Staff which are the users of the built system for the business of Sante Fe’s Taguktukan.  The web application performs basic features including the capability to user location, place orders, and track delive

. ries. Meanwhile, the web server processes the data that performs in the web application where it can request and receive a response from the web server. In order to fulfill the user's request, the web server needs to retrieve data from the cloud database. Additionally, this has the capacity to securely store massive volumes of data and make it available to the web server using APIs (Application Programming Interfaces), enabling the server to retrieve the needed data quickly and respond.

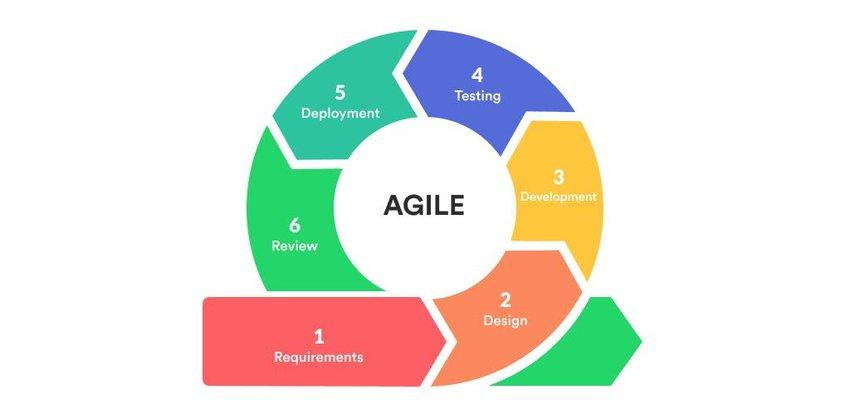
**CHAPTER III**

**DESIGN AND METHODOLOGY**

The research methods and design are covered in detail in this chapter. It provides a thorough justification for the methodologies chosen as well as an explanation of the strategies employed for data collection and analysis. In addition, outlining the techniques for design that will be utilized to create the system, the chapter also includes the data that was gathered throughout the research.

**Development Model**

The researchers used the agile development approach, as shown in Figure 2, to design and develop a location-based mobile ordering platform for Santa Fe Taguktukan. This approach allowed them to assess the project's direction throughout the development cycle and make necessary changes along the way. Agile methodology breaks the work into smaller parts and focuses on iterative development rather than long-term planning. The researchers followed a six-stage process that included requirement gathering and analysis, system design, implementation, integration and testing, deployment, and review. These stages explain how the system's researchers created, executed, and evaluated the system.



**Figure 2. Agile Model Development Methodology**

Agile development is a project management approach that emphasizes flexibility and iterative processes. It is considered the most effective way to implement system alterations because it enables developers to continuously adapt to changes in requirements and feedback from users. For the system that was proposed for Santa Fe Taguktukan, the researchers followed an agile development methodology. They started by conducting an interview with the business owner to gather information about the current ordering process and the challenges faced by the business. From this interview, they learned that the business still relied on a manual ordering process, which led to limitations in their market reach and challenges with manual recording of inventory and sales.

The researchers set out to create an innovative and flexible way of ordering to address these problems. Through an iterative process, they designed a location-based ordering platform that would allow customers to place orders quickly and easily and help the business track its inventory and sales. The agile approach enabled the researchers to adapt the system to the specific needs of Santa Fe's Taguktukan, ensuring that it met their requirements and provided an effective solution to their problems.

**Requirement Analysis**

A detailed account of the activities performed by the researchers is presented, along with information about the problem they aimed to solve and the intended users of the proposed system. To gather information about the current ordering process, the researchers conducted an interview with Santa Fe's Taguktukan business, which is the client for this study.

The business relied on manual ordering through a variety of channels, including chat, SMS, phone calls, and walk-ins at their store, which was learned during the interview. One of their biggest issues was found to be the manual ordering procedure, which increased the possibility of records becoming lost or damaged.

To address these problems, the researchers proposed a location-based ordering platform that would allow customers to place orders easily and quickly. The system would help the business to track its inventory and sales, eliminating the need for manual recording. The proposed solution was designed with the specific needs of Santa Fe Taguktukan in mind and aimed to provide a flexible and effective way to manage their ordering process.

**Analysis of the Existing System**

Santa Fe Taguktukan is a popular food establishment that offers a diverse range of delicious Filipino dishes. However, the business faces several challenges due to its reliance on a manual ordering process. The business doesn't have a system because customers can only order by walking in, calling, or sending text messages. This limits the number of potential clients who may prefer the convenience of online ordering. By not having an online ordering system, the business misses out on potential customers who could have ordered from them if an online ordering system was available.

Moreover, relying on a manual inventory and sales recording process can result in inaccuracies and inefficiencies. It could lead to difficulties in keeping track of stock levels, leading to stock outs or overstocking of certain items. This could also make it difficult for the business to analyze its sales data to make informed decisions on pricing and promotions.

**Fishbone Analysis**

The researchers conducted a study to address an issue faced by Santa Fe's Taguktukan customers and demonstrated that a system provides a solution to the problem. They also identified four root causes related to the customers' difficulties and used Fishbone Analysis, a visual method, to categorize the probable sources of the issue into different branches based on different categories like people, process, environment, and materials. Figure 3 represents the results of the fishbone analysis and provides a visual representation of the identified root causes and how related to the problem. This method and figure could help researchers and others better understand the sources of the problem and develop more effective solutions.

**Figure 3.Fishbone Diagram**

The causes in people in a fishbone diagram that can lead to errors in the manual order process include human error, poor communication, and misplacement of records. Human error occurs when making mistakes or forgetting things, because of inexperience, fatigue, or becoming preoccupied. Poor communication occurs when people are unable to successfully communicate, which can lead to misunderstandings, confusion, and errors. Record misplacement occurs when crucial data is lost , which can slow down human order processing and result in mistakes.

Time-consuming processes, manual data entry errors, and walk-ins to purchase are some of the causes in the process category of a fishbone diagram that can lead to inefficiencies and errors in the manual order process. When a process takes too long, this can cause delays and reduce efficiency, leading to frustration for customers. Manual data entry errors in inventory and sales by staff can lead to incorrect analyses, reports, and decisions. Walk-ins to purchase can also cause delays in the manual order process, as customers need to wait in line to place their orders, which can lead to increased wait times and reduced customer satisfaction.

Materials and environment are two categories in a fishbone diagram that can also contribute to inefficiencies and errors in the manual order process. Manually creating receipts can be time-consuming. Additionally, writing down inventory and sales data in a record book can consume more paper than necessary, which is not good for the environment. In the environment category, factors such as business location and uncomfortable temperatures can also affect the manual order process. The Business with a poor location may not attract many customers, which would result in decrease of revenue and fewer opportunities for growth. People may be less likely to stay in an environment that is excessively hot or too cold, which can affect staff productivity and customer satisfaction.

**System Boundary**

The system boundary refers to the limits of the system that is being analyzed,  beyond which external components are regarded as being outside the bounds of the study. Figure 4 shows a diagram that provides a high-level overview of the input, processing, and output components of a location-based mobile ordering platform for Santa Fe Taguktukan. Demonstrates how the various parts of the system work together to provide a convenient experience for the users.

**Figure 4. System Boundary**

The platform operates within a defined system boundary, where it receives inputs from users such as their location, preferences, and order details. The system processes this information by tracking the user's location, selecting menus based on preferences and location, allowing order customization, and securely processing payment information. The platform generates outputs such as order confirmations, notifications, and alerts to keep users informed about the order status. It also facilitates order placement, and tracking. Additionally, the system prompts users for feedback to improve the overall user experience. The platform's general system boundary encompasses the interactions between customers, staff, and payment gateways.

**Hardware Requirements**

The location-based mobile ordering platform is made to work in a particular way. To make sure the location-based mobile ordering platform works well without any technical issues, requires specific hardware requirements. These requirements are the best match for the structure of the platform. You will be able to assure the smooth functioning of your platform when using suitable hardware such as some types of processors, memory and storage. Before starting using the Platform, make sure to have the proper hardware installed to avoid any trouble and ensure performance in line with expectations.

**Table 1.**

***Hardware Minimum Requirements for System Implementation***

|  |  |
| --- | --- |
| Hardware | Minimum requirements |
| Processor speed | 2.3 GHz or more |
| Memory | At Least 4 GB or more |
| Storage | 500 GB HDD or 256 GB SSD |
| CPU | 2 core or 4 core |

The system requires to meet the minimum hardware requirements for system implementation to function the system properly. The processor, which is in charge of carrying out calculations and instructions, must have a speed of 2.3 GHz or more. The memory should have at least 4 GB RAM or more to manage several tasks and prevent system delay. Last but not least, the storage device, which permanently keeps data, should have a minimum capacity of 256 GB solid-state drive or 500 GB hard disk drive (HDD), to provide enough space for the system. The system requires a 2 and 4 core processor to multitask faster and more efficiently.

**Table 2.**

***Hardware Minimum Requirements for Web User***

|  |  |
| --- | --- |
| Hardware | Minimum requirements |
| Processor speed | 2.3 GHz or more |
| Memory | At Least 4 GB or more |
| Storage | 500 GB HDD or 256 GB SSD |
| CPU | 2 core or 4 core |

For the system to function smoothly for web users, certain hardware requirements must be met. The processor that runs the calculations and instructions should be at least 2.3 GHz. The memory that handles multiple tasks and avoids system slowdowns should have at least 4GB of RAM or more. A storage device that stores data persistently must have a minimum capacity of 256 GB on an SSD or 500 GB hard drive to provide enough space for the system.  A 2 or 4-core processor will make the system run faster and more efficiently.

**Table 3.**

***Hardware Minimum Requirements for Mobile User***

|  |  |
| --- | --- |
| Hardware | Minimum requirements |
| Processor speed | Quad Core 1.8 GHz / A11 Bionic |
| Memory | At Least 3 GB RAM |
| Storage | At Least 32 GB ROM |

To run smoothly the system for mobile users, also needs to meet the minimum hardware requirements. In Android devices, the processor speed must be at least four cores at 1.8 GHz. In iOS devices, the processor must be A11 Bionic or higher. Memory should be at least 3GB of RAM to handle more tasks and avoid system slowdowns. The ROM capacity should be at least 32GB to provide enough space for system and user data. These hardware requirements are essential to provide mobile users with a smooth and responsive experience and allow them to easily access and use the system.

**Software Requirements**

The location-based mobile ordering platform needs software that is designed to suit the requirements of the business and customers, ensuring that everyone has a smooth and easy experience.

**Table 4.**

***Software Requirements***

|  |  |
| --- | --- |
| Requirements | Specification |
| Operating System | Windows 7  or Higher |
| Web Browser | Google Chrome, Mozilla Fox, Microsoft Edge and Safari |
| Language | Python, Java, C++, HTML, CSS, and JavaScript |
| Database | MongoDB |
| IDE | Visual Studio Code (VS Code) |
| Use in Implement Location | GIS (Geographical Information System) and Google Map API |

In addition to the hardware requirements, suitable software needs Operating systems, web browsers, databases, and software tools are among the types and specifications of the system's needs. The computer should have Windows 7 or a newer version of the operating system to meet the location-based mobile ordering platform's software requirements. Google Chrome, Mozilla Firefox, Microsoft Edge, or Safari are the recommended web browsers. The programming languages that will be used are Javascript, HTML, CSS, ReactJS, ExpressJS, and Bootstrap. Meanwhile,the data is stored in a database which is MongoDB and developed using Visual Studio Code (VS Code). All these requirements guarantee that the system functions smoothly and allows it to efficiently employ location-based features. The system uses a geographic information system (GIS) and the Google Maps API to establish the user's location.

**Functional Requirements**

In this section, researchers used to define the specific capabilities and features that a system or product must possess in order to meet the needs of the users. They provide a clear understanding of what the system should do and how to behave, allowing for effective planning, development, and testing. This serves as a reference point throughout the development process, ensuring that the final product meets the intended specifications and that any mistakes or changes are identified and addressed.

**1. Customers**

1.1.Allow users to register and login their account.

1.2. Allow users to search for nearby branches based on their location.

1.3. Allow users to browse menus, view dish descriptions, and photos, and place orders for delivery or pickup.

1.4. Allow users to track the status of their orders, including estimated delivery time.

1.5. Allow users to give their rate and reviews about their order.

**2. Staff**

2.1. Allow staff to manage the menu items offered by the platform,   including adding, editing, and removing items. This includes the ability to set prices, descriptions, and images for each menu item.

2.2. Allow staff to have access to various reports that provide insights into the platform's performance. This includes reports on sales, user behavior, and order history.

2.3 Allow staff to configure system settings in set up branch location and manage inventory information.

2.4 Allow staff to monitor order processing such as receive order notifications and track order status.

2.5 Allow staff to deliver orders such as assigned delivery orders, update delivery status and communicate with customers.

**Non-Functional Requirements**

Apart from making sure that the system performs the main job correctly, the developers also thought about how the system should work and behave. These additional requirements help the system to work more efficiently, but they do not directly affect what the system does.

**Accessibility.** Researchers require assessing the platform's ability to provide equal access to all users, including those with disabilities, low-income users, and users who may not have access to high-speed internet or the latest mobile devices.

**Compatibility.** This system guarantees compatibility with a variety of mobile devices, operating systems, and web browsers. This also enables us to integrate with other systems and applications as needed.

**Maintainability.**  The system is easy to maintain this includes making updates or changes to the system without causing downtime or affecting the system's performance. This can be achieved by the help of modular architecture and well-documented code that can be easily understood and updated by developers.

**Performance.**  The researchers used a cloud-based infrastructure which is MongoDB, this can be assured to process a large number of orders and location requests without significantly degrading performance or experiencing any downtime. As a result, the platform would be able to support several concurrent users without experiencing any lag or crashes. Additionally, on a well-optimized mobile ordering platform, the time it takes for the platform to respond can be anywhere from a few seconds to around 10-15 seconds. For instance, when you place an order using the platform, it might take around 2-3 seconds to get a response if the system is working well, your internet connection is fast, and the servers are not overloaded. If the platform needs to find out your location, it could take a few more seconds to fetch and process that information.

**Reliability.** In order to achieve the reliability of the system, the researchers provide consistent service without errors or failures. This will be tested thoroughly to ensure that all features and functionality are working as intended.

**Security.** Implementing access control measures to ensure that only authorized personnel have access to sensitive data and limiting access to data based on user roles and permissions. Additionally, location-based mobile ordering platforms can ensure that user data is protected, and the platform is secure from potential threats. By regularly assessing and updating the platform's security measures to ensure that it remains protected against new and evolving security threats.

**Usability.** The platform is built to be user-friendly and easy to navigate, with intuitive interfaces and clear instructions. This includes providing clear and concise instructions on how to use the platform, as well as easy-to-use features for placing orders and tracking location.

**Constraints**

The preceding tables have considered different constraints in software design. The ratings were based on an independent and thoughtful assessment of each option, taking into account the proponent's familiarity and background knowledge.

Table 5 will be rated scale 1-5, in which 1 is the lowest and 5 is the highest rate. This displays different design options and the corresponding factors to consider, which include expertise, security, speed, and cost of using the technologies. The expertise column is determined by the level of proficiency of the researchers in utilizing the programming languages. Security is based on the measures implemented by the relational database management system. The speed pertains to the programming language used, while the cost is influenced by the available hosting platform subscription fees

***Table 5.***

***Evaluation of the Considered Multiple Designs***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Options** | **Expertise** | **Security** | **Speed** | **Cost** |
| Design A | 3 | 4 | 5 | 4 |
| Design B | 4 | 4 | 4 | 2 |
| Design C | 3 | 5 | 3 | 5 |

Based on the table, in terms of expertise, Design B has the highest rate between the two for the reason that PHP and MySQL are commonly used by the programmer. For security, Design C has the higher security among the two designs, because it is known for strong security features. As regards to speed, Design A is the highest between the two designs. Node.js is known for high performance. At last, cost rate the Design C as the highest. The hosting and maintenance costs for Angular and PostgreSQL are higher compared to other technologies.

**Multiple Designs**

The main components of the Location-Based Mobile Ordering Platform are modules that rely on a database to browse menus, make orders, access the location, store the inventory, and generate reports. These modules are employed in order to ensure that the platform could provide a customized and user-friendly experience for the customer and staff. Each module is designed to handle specific tasks and functions, such as user management, order management, and location tracking.

By breaking down the platform into these seven distinct modules, developers were able to ensure that each module could be independently tested and improved without affecting the overall functionality of the platform. This modular approach also enables future enhancements and updates to be made more efficiently and effectively.

**Figure 5. System Modules**

As shown in the block diagram, the location-based mobile ordering platform consists of seven modules, and each module is developed and designed based on the functions explained below:

1. User Management Module: This module is responsible for managing user accounts, as well as handling authentication and authorization.
2. Menu Management Module: This module manages the items available for ordering, including prices, descriptions, and images.
3. Order Management Module: This module tracks and manages customer orders, including order history and status updates.
4. Location Management Module: This module tracks and manages customer orders, including order history and status updates.
5. Inventory Management Module: This module manages location data for the platform, including maps, geolocation, and store hours.
6. Reporting and Analytics Module:  This module generates reports and analytics on key performance metrics, such as sales, customer behavior, and order volume.
7. Rate and Review Module: This module allows customers to leave ratings and reviews on their experiences with the platform and the businesses they order from.

**Security**

To ensure the security of the ordering platform, the designers placed great emphasis on implementing managing access methods based on the Role-based access control (RBAC) Model. This is a framework that is specifically designed to secure user information detail, with key components including users, roles, permissions, and capabilities. A visual representation of this framework is shown in Figure 6.

**Figure 6. RBAC Component Schema**

Role-Based Access Control (RBAC) is a way of controlling who has access to certain things in an organization. By assigning different roles for users of the system, and then giving access to resources based on those roles. This makes it easier for staff to manage who can access, by controlling access based on roles instead of individual users. The RBAC model works by defining roles within an organization and then assigning permissions to those roles. This way, users only have access to what they need to do their job, which helps keep things secure and reduces the risk of data breaches or unauthorized access.

**Trade-Offs**

The researchers focused on making difficult choices that would help them achieve their goals and improve their performance. In Table 6, this provided a list of different designs and the technology used for each one.

**Table 6.**

***Multiple Technology Stacks***

|  |  |
| --- | --- |
| **DESIGN** | **TECHNOLOGY STACK** |
| **Design A** | **HTML, CSS, JavaScript, Bootstrap Node.js MongoDB** |
| **Design B** | **HTML, CSS, JavaScript, PHP, MySQL** |
| **Design C** | **HTML, CSS, JavaScript, Angular, PostgreSQL** |

Design A is formed by the options that will be used to build the location-based mobile ordering. Researchers choose to utilize Design A in development for the reason that HTML, CSS, and JavaScript are the common technologies used in web development to create the visual and interactive aspects of a webpage. Bootstrap is a widely-used front-end framework that offers ready-made CSS and JavaScript components to make development easier. Node.js is a JavaScript runtime environment for server-side programming, while MongoDB is a NoSQL database management system that stores data as documents.

Therefore, Design B will be the alternative to Design A seeing that this makes the system reliable and effective. In web development, HTML, CSS, and JavaScript are the usual technologies used for creating the visual and interactive aspects of a web page. PHP is a frequently-used scripting language that runs on the server and is responsible for generating dynamic content, while MySQL is a commonly-used open-source database management system used to store and retrieve data.

Moreover, Design C, which are the HTML, CSS, and JavaScript are the standard front-end technologies used in web development to create the look, feel, and behavior of web pages. Angular is a front-end JavaScript framework that helps to simplify the development process by providing additional tools and features for building complex web applications. PostgreSQL is a relational database management system that is known for reliability and scalability.

**System Design/Architecture**

Figure 7 is a visual representation that uses symbols to show how information flows in the location-based mobile ordering system. This figure shows how different parts of the system work together to collect, change, store, and share data. This helps understand how information moves between the system and the surroundings, as well as between different parts within the system itself.

**Figure 7. Context Diagram**

Figure 6 shows the context of two types of individuals in the system: the customer and the staff. In the middle, there is a main process that manages the system. The customers have the ability to order and see the status of their orders. On the other hand, the staff can process orders and check the status of orders. This diagram helps to understand the different tasks and responsibilities assigned to each role within the system.

**Link Architecture**

Displayed in figure 8 is the link architecture which shows the functionality of users such as staff and customers and would further be used as a basis in constructing the flow of the system.

**Figure 8. Link Architecture**

**Use Case**

A use case diagram provides an overview of the interaction between the system and the actors, highlighting the functionalities and scenarios, as shown in Figure 9. The figure shows the relationships and dependencies between the actors and the system.

**Figure 9. Use Case Diagram**

This use case involves two actors such as the customer and staff of the system. The primary objective of this use case is to provide a consistent and convenient way for customers to place orders and receive food from the nearby Santa Fe Taguktukan branch. Customers initiate the process by accessing the mobile platform and searching for nearby branches based on their current location including, browse menus, view order description, photos, and place orders for delivery or pickup. Track the status of their orders, including estimated delivery time and also give their rate and reviews about their order.

While in staff, manage the user account, which is creating new user accounts, modifying existing accounts, and deactivating user accounts if needed. The staff has the authority to configure various system settings. This involves tasks such as setting up branch locations, updating menu items and prices, managing inventory information, and customizing platform features according to the business requirements. The staff is responsible for monitoring the processing of orders. They receive notifications for new orders, track order statuses, and resolve any issues that may arise during the order fulfillment process. The staff utilizes the platform's reporting and analytics capabilities. They can analyze sales performance, monitor customer behavior, and generate actionable insights based on the collected data. Lastly, the staff can view assigned delivery orders, update the delivery status, and communicate with customers to confirm delivery details.

**Sequence Diagram**

Sequence diagram as shown in Figure 10 is an interaction diagram that provides the basic order workflow. This diagram illustrates the basic order process of the user's system.

**Figure 10. Sequence Diagram**

Initially, the customer and staff shall login to the system. Using location-based features, the customer may need to create an account with the platform. This account will usually require the customer to provide certain personal information, such as their name, email address, and possibly their phone number. Once the customer has created an account, they may need to turn on the location feature within the application or on their device. This feature allows the system to generate the customer's location information in order to provide location status.

Both users can view the order details. From the customer's perspective, being able to view the order details allows them to confirm that they have purchased the correct item or service and that all the details are accurate. Also allows them to track the progress of the order and ensure that it has been shipped or delivered as expected. From the staff perspective, being able to view the order details allows them to manage the orders and provide support to the customer if needed. This includes verifying that the order has been placed correctly, checking the status of the order, and addressing any concerns or issues that the customer may have. The system will respond to the request of each user, and this can update the order status. Lastly, the customer can rate the ordered food.

**Data Flow Diagram**

The context diagram is an important part of a system's data flow diagram. This gives a quick summary of how information moves in the system, particularly between the main entities or users. These entities have their own input data that goes through different processes in the system. These processes change the input data into useful results. The context diagram provides a general understanding of how information travels between entities and processes, without going into specific process details. Stakeholders and analysts see the flow of information and is a starting point for making more detailed diagrams that look closely at individual processes.

**Figure 11. Level 0 Data Flow Diagram**

The Level 0 Data Flow Diagram is a visual representation that gives a broad understanding of how the various parts of the location-based mobile ordering platform interact and collaborate. This presents the major components of the system and illustrates how they communicate and exchange data with each other.

**Database Design**

The way the system's database is planned allows us to see a picture of how all the tables in the database are connected to each other. Considering all the information we currently have, what we will need in the future, and how that information might change over time.

**Figure 12. *Database Design***

**Graphical User Interface**

**Software**

The researchers have decided to use any operating system such as Windows, Linux and Mac OS. Android and iOS for mobile users as the software for the location-based ordering system. The operating system takes care of managing the device's hardware and software resources and provides services that help system programs run smoothly. It acts as a bridge between the user and the devices, allowing them to interact with each other.

To create the visual and interactive parts of the system, the researchers have chosen to use HTML, CSS, and JavaScript. These are commonly used technologies in web development that allow them to make the ordering system visually appealing and interactive. Bootstrap is a widely used front-end framework that offers ready-made CSS and JavaScript components to make development easier. Node.js is a JavaScript runtime environment for server-side programming, while MongoDB is a NoSQL database management system that stores data as documents.

**Web Platform**

The researchers believe that Bootstrap is the best choice among other alternatives because it is efficient and cost-effective. It allows them to create customized layouts for the location-based mobile ordering system using HTML, CSS, and JavaScript. By utilizing Bootstrap, they can save time and effort in designing and coding these interface components from scratch, as the framework provides pre-designed templates and functionalities that can be easily customized to suit needs.

Bootstrap is considered the best option for creating a responsive website due to its numerous advantages. Firstly, Bootstrap provides a responsive grid system that automatically adjusts the layout and elements of a website based on the screen size of the device being used. This ensures that the website looks visually appealing and functions properly on various devices, including desktops, tablets, and smartphones. It is also well documented, providing comprehensive and easy-to-understand documentation that guides developers on how to use its features effectively. This makes it accessible to developers of all skill levels and facilitates faster development.

**Database**

The researchers have decided to use MongoDB as the database management system. MongoDB is a type of database that can store and organize data in a flexible way. It is different from traditional databases because it doesn't require data to fit into strict tables and rows. This makes it easier to handle different types of information, like customer details and order information. MongoDB is also designed to handle large amounts of data and high levels of activity, so it can handle a lot of orders and customer information without slowing down. It has powerful tools for searching and retrieving data quickly, which is important for finding the right information when customers place orders. Additionally, MongoDB has features that ensure data is always available and protected, even if there are technical issues.

**Subscription**

Listed in Table 6 are the software-as-a Service options that the researchers need to subscribe to in order to use specific products or services. One of these options is the website domain, which is the unique address that users see in their browser's address bar. Another option is website hosting, which is a subscription that ensures the website remains accessible on the internet.

**Table 7.**

***Subscription Fees***

|  |  |  |
| --- | --- | --- |
| **Software as a Service (SaaS)** | **Description** | **Cost** |
| Web Hosting | This subscription would maintain the website's online accessibility | P 2,200 for one year |
| Website Domain | Subscription for domain | P 399 |
|  |  | **Total :** P 2,599 |

**Testing**

The quality model is like the foundation of a framework used to assess the quality of a software product. It helps determine which aspects of the software's performance and features will be taken into account during the assessment. In this case, the researchers found that ISO/IEC 25010, a widely recognized standard, is a good framework to define the specific metrics and measurements that are important for evaluating software quality. This standard covers eight important characteristics that a high-quality software application should possess.

**Testing Procedure**

To make sure the system functions properly, it needs to go through testing procedures. These procedures involve various tests that are performed to check different aspects of the system's performance and functionality. The system has undergone several tests to ensure its proper functioning, and these tests cover a range of areas to identify any potential issues or problems.

**Usability testing.** This test focuses on how easy it is for users to understand and use the system. It evaluates the system's effectiveness and how well it performs when used by real users. If the test results show that the system doesn't meet users' expectations, the researchers will make the necessary adjustments. The researchers demonstrate and explain the system to the client, who then gets to use it and provide feedback. This feedback is used to improve the system and make it easier for users to navigate and interact with it.

**Functionality testing.** This test ensures that the system is functioning correctly and meets all the requirements and goals of the project.

**Reliability testing.** This testing focuses on maintaining the system's effectiveness consistently over time. It specifically looks at the system's ability to handle and maintain the accuracy and reliability of its data. The researchers subjected the system to different types of data and assessed how well it could handle them without encountering any issues or malfunctions, as well as how long it could function without any problems.

**Efficiency testing.** This test evaluates how well the system functions while it is running and being used by users. It assesses whether the system performs smoothly and meets the expectations of users as they interact with it.

**Data Gathering**

The researchers had a direct conversation with the business owner of Santa Fe Taguktukan, where they discussed and evaluated the system. This gave the owner an opportunity to share their thoughts, suggestions, and feedback about the system. In addition, the researchers handed out questionnaires to five employees of the business to gather their opinions. They also planned to distribute a customer survey to at least 100 users using Google Forms. All the data collected from these interactions will be carefully documented and analyzed. This analysis will be useful for identifying areas for improvement and guiding the future development of the system.

**Deployment**

In this phase, the researchers will focus on development, making changes to the system, testing them thoroughly, and then implementing them. The main objective is to improve the access control system so that it can quickly handle customer requests and adapt to their needs. The team will also keep working on adding new features and functions to meet the requirements of the users. Table 9 provides a roadmap that outlines the necessary steps to be followed until the final phase of the project is successfully completed.

**Table 8.**

***Deployment Plan***

|  |  |  |  |
| --- | --- | --- | --- |
| Activity | Duration (Days) | Expected Start | Expected Finish |
| Requirements | 44 Days | 04-03-2023 | 05-17-2023 |
| Design | 17 Days | 04-30-2023 | 05-17-2023 |
| Development | 141 Days | 05-21-2023 | 10-9-2023 |
| Testing | 47 Days | 10-9-2023 | 11-25-2023 |
| Deployment | 5 Days | 11-25-2023 | 11-30-2023 |

The deployment plan follows the agile method process, which consists of several stages that guide the development of the system. These stages include identifying the requirements, designing the system, developing the necessary components, testing them thoroughly, deploying the system, and conducting a review to assess its performance. This plan serves as a roadmap, ensuring that each phase is completed effectively and leading to the successful implementation of the system.

**Maintenance Plan**

The maintenance plan created by the researchers is designed to keep the system running smoothly and avoid problems like errors or crashes. They want to make the system work better and prevent any issues that might occur. To do this, they have created a plan with specific actions that need to be done regularly. These actions include things like upgrading the system and fixing any bugs that are found. By following this plan, they can make sure that the system is secure. The maintenance program will also include steps to make the system perform better and adapt to the changing requirements of the people who use it.

**Risk Management**

Identifying and managing possible issues or dangers that can arise during the system's development and use is the crucial work of risk management. It's similar to establishing a list of potential problems that might arise and coming up with solutions to eliminate or reduce those risks before they become serious issues for the staff and the customers. The goal is to be proactive and take steps to avoid any major problems that might influence the system's smooth operation and customer satisfaction.

**Risk Management Plan**

Risk refers to the possibility of something going wrong or not going as planned, which could have negative consequences or impact the goals you want to achieve. Risks are uncertain and can result in harm, loss, or undesirable outcomes. Understanding and managing risks is important because they can greatly influence the success or failure of a project or business.

To effectively deal with risks, a risk management plan is needed. This plan provides a structured approach to identify, analyze, and respond to risks. It helps you outline specific strategies, actions, and who is responsible for addressing the risks. The plan also includes backup plans in case the risks actually happen. Having a risk management plan ensures that risks are managed in a systematic and consistent way, making organizations better prepared and able to handle potential challenges.

**Risk 001: Privacy Breaches.** If a location-based mobile ordering platform collects and stores sensitive user information, like names, addresses, and payment details, there is a risk that unauthorized individuals or hackers may gain access to this data. This can lead to the compromise of personal or financial information, potentially resulting in identity theft, fraud, or other harmful consequences for users.

**Risk 002: Malicious Attacks.** Location-based mobile ordering platforms can be attacked by cybercriminals using different methods like DDoS attacks, malware, and phishing. Such attacks can interrupt the platform's services, cause user data to be compromised, or take advantage of system weaknesses to access unauthorized information. This can lead to problems with the platform's functionality, users' personal information being at risk, and people losing trust in the platform.

**Risk 003: Fraudulent Activities.** Location-based mobile ordering platforms can attract people who want to do scams or cheat others. They might do things like making fake orders, using someone else's payment details to buy things without permission, or stealing someone's identity. These fraudulent actions can cause people to lose money, both the users and the platform, and the people who did the scams could get in trouble with the law.

**Risk 004: Technical Issues.** Location-based mobile ordering platforms can sometimes have technical issues like the system not working properly, software mistakes, or problems with different devices or operating systems. These issues can interrupt the platform's services, causing things like orders not going through correctly or the platform not working well. These technical difficulties can make users frustrated, unhappy with their experience, and can also give the platform a bad reputation.

**Risk 005: Geolocation Inaccuracies.** Depending on how accurate the location information is on the platform, there is a chance that your order might end up in the wrong place or that the delivery address could be incorrect. This could result in your order being sent to the wrong location, causing delays or even failed deliveries. As a result, you may be unhappy with the service, and it can create problems for the platform, like dealing with logistics challenges and potentially losing money.

**Risk 006: Customer Disputes.** If customers have problems with their orders on the platform, such as incorrect items, refunds, or quality issues, it can lead to negative experiences for them. This can hurt the platform's reputation, result in bad reviews, and even lead to legal problems if the issues are not resolved quickly and effectively.

**Risk 007: Regulatory compliance.** Location-based mobile ordering platforms have to follow certain rules and laws to protect your information, make sure you have your rights as a consumer, and ensure the safety of the food you order. If the platform doesn't follow these rules, they can get in trouble with the law, face fines or other legal consequences, and it can also make people think poorly of the platform.

**Risk 008: Reputation management.** If people leave bad reviews, complain, or if there are incidents that get public attention, it can make the platform look bad. This can lead to people not trusting the platform and can even affect its ability to attract new users and partners. It's like having a bad reputation, and that can make it hard for the platform to grow and be successful in the market.

**Risk 009: Dependency on Third-Party Services.** Location-based mobile ordering platforms depend on other companies to provide services like maps or handling payments. If these companies have problems or stop working, it can cause issues with how the platform works and how users experience it. It's like if a vital piece of the platform is missing or not working properly, and it can make it difficult for users to use the platform as intended.

**Table 9.**

***Risk Assessment Matrix***

*Source:* [*https://www.pinterest.ph/pin/725009239999624572/*](https://www.pinterest.ph/pin/725009239999624572/)

A risk assessment matrix is like a chart that helps people who run a location-based mobile ordering platform understand and deal with different types of problems that could happen. It helps them figure out which problems are the most important to focus on and how they could affect the platform. The matrix is made up of a grid with different risks listed on it. Each risk is looked at to see how likely it is to happen and how bad it would be if it did happen. By using the matrix, the platform's owners can decide which risks are the most serious and need the most attention. They can then make plans to prevent or fix those problems, like making the platform more secure, improving customer service, or making sure they follow the rules and laws that apply to their business.

***Table 10.***

**Risk Matrix**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Id | Risk | Severity | Probability | Risk Level |
| 001 | Privacy Breaches | Catastrophic | Unlikely | Extreme |
| 002 | Malicious Attacks | Major | Unlikely | High |
| 003 | Fraudulent Activities | Extreme | Moderate | High |
| 004 | Technical Issues | Moderate | Moderate | High |
| 005 | Geolocation Inaccuracies | Moderate | Minor | Moderate |
| 006 | Customer Disputes | Moderate | Moderate | High |
| 007 | Regulatory Compliance | Major | Moderate | Extreme |
| 008 | Reputation Management | Unlikely | Minor | Low |
| 009 | Dependency on Third-Party Services. | Unlikely | Minor | Low |

The table provided above presents a comprehensive overview of all the potential risks that may be encountered by a food ordering system. As an integral tool for the food industry, the system faces a range of risks that can significantly impact its functionality and operations. Each risk identified in the table is meticulously analyzed, taking into account its likelihood of occurrence and the magnitude or severity of its impact on the food ordering system. By carefully assessing these risks, stakeholders involved in the development and management of the system can gain valuable insights into the potential challenges and vulnerabilities it may face. This enables them to implement robust security measures, establish efficient processes, and design effective contingency plans to ensure the smooth and secure functioning of the food ordering system, ultimately enhancing customer satisfaction and optimizing business performance.

***Table 11.***

**Risks Treatment**

|  |  |
| --- | --- |
| **Risk** | **Duration** |
| Privacy Breaches | To address the privacy breach, it is crucial to stop any unauthorized access to sensitive information. This can be done by isolating affected systems, deactivating compromised accounts, or temporarily suspending affected services. Open and timely communication with the individuals, employees, and other parties impacted by the breach is vital. Offering assistance and guidance to those affected, such as credit monitoring services or help with identity theft, can help minimize the potential damage caused by the breach. |
| Malicious Attacks | Make sure to regularly update all your software, including your computer's operating system, apps, and plugins, with the latest security patches and fixes. This helps to fix any weaknesses or vulnerabilities that attackers could exploit. Also, teach people about common security risks like phishing attacks or social engineering, and encourage them to adopt safe habits such as using strong passwords, managing them properly, and being careful when opening emails or browsing the internet. |
| Fraudulent Activities | Perform extensive background checks on employees and partners to ensure their integrity and trustworthiness.  Establish controls to secure your assets, including physical and logical access controls, system permissions, and password policies. |
| Technical Issues | Utilize monitoring tools and practices to proactively detect possible technical problems like system errors, performance bottlenecks, or hardware failures before they escalate. Create a specialized support team or help desk dedicated to promptly assisting users with technical issues. Ensure that users have accessible communication channels to report problems and receive timely assistance. |
| Geolocation Inaccuracies | Use reliable data sources like GPS, Wi-Fi positioning, cellular network data, and IP address geolocation to gather information from multiple sources, enhancing the precision of location-based services. Implement alert systems to notify users when there is a possibility of geolocation inaccuracies or when the accuracy level drops below a predefined threshold. |
| Customer Disputes | Promptly address customer inquiries, concerns, and complaints, showing a genuine desire to resolve their issues and reach a satisfactory outcome. Provide comprehensive training to employees, ensuring they understand and follow company policies when interacting with customers. |
| Regulatory Compliance | Conduct a comprehensive evaluation of the specific regulations and requirements that are applicable to your business. Keep yourself well-informed about the relevant laws, regulations, and industry standards that pertain to your business operations. |
| Reputation Management | Emphasize the consistent delivery of high-quality products or services that meet or exceed customer expectations.  Make excellent customer service a priority, ensuring positive interactions with customers at every stage of their journey. |
| Dependency on Third-Party Services | Regularly assess the performance and reliability of third-party services to detect any possible issues or decline in service quality. Ensure that contracts with third-party vendors contain clear terms outlining responsibilities, liabilities, termination procedures, and contingency plans in the event of service disruptions or vendor failures. |

Despite the risk mitigation strategies listed in Table 11, the table highlights a range of potential risks that a system might face. These risks include privacy breaches, malicious attacks, fraudulent activities, technical issues, geolocation inaccuracies, customer disputes, regulatory compliance, reputation management, and dependency on third-party services. The table lacks specific information on the approaches to addressing and reducing these risks, as well as the researchers' plans for mitigation. The only requirement is to assign a team member who will actively monitor the triggers for these risks and implement the suggested solutions.

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