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**Development of an IOS application
for cooking with recipes**

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Diploma work

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Abstract

There is a high significance of cooking that is well-known in modern life. Specifically, home cooking is one of the approaches to a healthy lifestyle since it impacts improved diet quality and contributes to the recognition of healthy food. However, people are increasingly relying on food prepared away from home due to the fast-paced nature of today's world and the convenience of food delivery technologies, which has led to cooking taking a back seat. Additionally, the lack of a competitive cooking app offering features similar to those of Western mobile applications is another reason why people do not prefer to cook at home, resulting in a significant gap in the IT field of CIS countries.

In response to these challenges, this diploma project aims to provide users with a valuable tool for their culinary pursuits, inspiring people and satisfying both social and technological requirements. The app is designed with contemporary design solutions, offering a wide range of necessary features and convenient in-app navigation. By simplifying recipe discovery and fostering a sense of community around cooking, the app aims to encourage users to explore their potential food preferences and dietary restrictions, enhancing their personal experience in cooking.

Extensive research has been conducted to inform the development of the app. A mixed methodology approach was employed, allowing for a comprehensive understanding of the vision and opinions of both proficient cooks and cooking enthusiasts. The proficient cooks were interviewed, providing valuable insights through open-ended questions, while the cooking enthusiasts participated in a survey featuring close-ended and multiple-choice questions. Additionally, a thorough market analysis was conducted, comparing the main Western cooking applications to identify their strengths and weaknesses.

The culmination of this research and analysis has guided the definition of the app's features and design. The app boasts an aesthetic and modern UI design, ensuring an engaging and visually appealing user experience. The seamless in-app navigation further enhances user convenience, allowing for effortless exploration and utilization of the app's functionalities.

Overall, this diploma project aims to bridge the gap in the CIS countries' cooking app market by offering a comprehensive, user-friendly, and aesthetically pleasing solution that inspires users to embrace home cooking and explore new culinary horizons.

Аннотация

В современной жизни общеизвестно большое значение кулинарии. В частности, домашняя кулинария является одним из подходов к здоровому образу жизни, поскольку она влияет на улучшение качества питания и способствует признанию здоровой пищи. Тем не менее, люди все больше полагаются на еду, приготовленную вдали от дома, из-за стремительного характера современного мира и удобства технологий доставки еды, что привело к тому, что приготовление пищи отошло на второй план. Кроме того, отсутствие конкурентоспособного кулинарного приложения, предлагающего функции, аналогичные западным мобильным приложениям, является еще одной причиной, по которой люди не предпочитают готовить дома, что приводит к значительному отставанию в ИТ-сфере стран СНГ.

В ответ на эти вызовы этот дипломный проект призван предоставить пользователям ценный инструмент для их кулинарных занятий, вдохновляющий людей и удовлетворяющий как социальные, так и технологические требования. Приложение разработано с использованием современных дизайнерских решений, предлагает широкий набор необходимых функций и удобную навигацию внутри приложения. Упрощая поиск рецептов и способствуя созданию чувства общности при приготовлении пищи, приложение призвано побудить пользователей изучить свои потенциальные предпочтения в еде и диетические ограничения, расширяя личный опыт приготовления пищи.

Для разработки приложения было проведено обширное исследование. Использовался смешанный методологический подход, позволяющий всесторонне понять видение и мнения как опытных поваров, так и кулинарных энтузиастов. Опытные повара были опрошены, предоставив ценную информацию с помощью открытых вопросов, в то время как энтузиасты кулинарии приняли участие в опросе с закрытыми вопросами и вариантами ответов. Кроме того, был проведен тщательный анализ рынка, в ходе которого сравнивались основные западные приложения для приготовления пищи, чтобы выявить их сильные и слабые стороны.

Кульминация этого исследования и анализа привела к определению функций и дизайна приложения. Приложение может похвастаться эстетичным и современным дизайном пользовательского интерфейса, обеспечивающим привлекательный и привлекательный пользовательский интерфейс. Бесшовная навигация в приложении еще больше повышает удобство для пользователя, позволяя без усилий исследовать и использовать функциональные возможности приложения.

В целом, этот дипломный проект направлен на преодоление разрыва на рынке кулинарных приложений в странах СНГ, предлагая комплексное, удобное и эстетически приятное решение, которое вдохновляет пользователей

осваивать домашнюю кухню и открывать новые кулинарные горизонты.

Андалпа

Қазіргі өмірде тамақ дайындаудың маңыздылығы белгілі. Атап айтқанда, үйде тамақ дайындау салауатты өмір салтын қалыптастыру тәсілдерінің бірі болып табылады, өйткені ол тамақтану сапасын жақсартуға әсер етеді және пайдалы тағамды тануға ықпал етеді. Дегенмен, қазіргі әлемнің жылдам қарқыны мен тағамды жеткізу технологиясының ынғайлышына байланысты адамдар үйден тыс жерде дайындалған тағамға көбірек сенеді, бұл тағамды дайындаудың артта қалуына әкелді. Бұған қоса, батыстық мобиЛЬДІ қосымшаларға үқсас мүмкіндіктерді ұсынатын бәсекеге қабілетті аспаздық қолданбасының болмауы адамдардың үйде тамақ дайындауды таңдамауының тағы бір себебі болып табылады, бұл ТМД ИТ секторында айтарлықтай артта қалуға әкеледі.

Осы қыындықтарға жауап ретінде бұл бітіру жобасы пайдаланушыларды аспаздық ізденістері үшін құнды құралмен қамтамасыз етуге, адамдарды шабыттандыруға және әлеуметтік және технологиялық талаптарға жауап беруге бағытталған. Қолданба заманауи дизайн шешімдері арқылы әзірленді, қажетті функциялардың кең ауқымын және қолданба ішінде оңай шарлауды ұсынады. Рецепттерді табуды жеңілдету және тамақ пісіру кезінде қауымдастық сезімін ояту арқылы қолданба пайдаланушыларды өздерінің жеке тағам дайындау тәжірибесін арттыра отырып, олардың әлеуетті тағам қалаулары мен диеталық шектеулерін зерттеуге ынталандыруға бағытталған.

Қолданбаны әзірлеу үшін ауқымды зерттеулер жүргізілді. Тәжірибелі аспаздардың да, аспаздық әуесқойлардың да көзқарасы мен пікірлерін жанжақты түсіну үшін аралас әдістемелік тәсіл қолданылды. Ашық сұрақтар арқылы құнды ақпарат беретін тәжірибелі аспазшылар сауалнама жүргізді, ал аспаздық әуесқойлар жабық сұрақтар мен бірнеше таңдау сұрақтары бар сауалнамаға қатысты. Сонымен қатар, құшті және әлсіз жақтарын анықтау үшін негізгі батыстық аспаздық қолданбаларды салыстыра отырып, нарықты мұқият талдау жүргізілді.

Бұл зерттеу мен талдаудың шарықтау шегі қолданбаның ерекшеліктері мен дизайнын анықтауға әкелді. Қолданба эстетикалық және заманауи UI дизайнымен мақтана алады, ол тартымды және тартымды пайдаланушы тәжірибесін ұсынады. Қолданбадағы үздіксіз шарлау қолданбаның мүмкіндіктерін оңай зерттеуге және пайдалануға мүмкіндік беру арқылы пайдаланушы тәжірибесін одан әрі жақсартады.

Тұастай алғанда, бұл дипломдық жоба қолданушыларды үйдегі тағам дайындауды меңгеруге және жаңа аспаздық көкжиектерді ашуға шабыттандыратын жан-жақты, ынғайлышты, және эстетикалық жағымды шешім ұсына отырып, ТМД елдеріндегі аспаздық қолданбалар нарығындағы алшактықты жоюға бағытталған.

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DEFINITIONS

Following terms are used in this work:

Authentication	the process of verifying the identity of a user before authorizing access to a resource or service
Authorization	the process of determining whether a user has the necessary permissions to access a particular resource or perform a particular action
CocoaPods	a dependency manager for iOS and macOS projects that simplifies the process of integrating external libraries into Xcode projects
Figma	a web-based design and prototyping tool used for user interface and user experience (UI/UX) design
Firebase	a mobile and web application development platform that offers a number of different services and features, including real-time database, authentication, analytics and etc
Mockup	a visual representation or prototype of an app's user interface (UI) design
Model	represents the application's data and business logic
MVVM pattern	a design pattern used in software development, particularly in user interface design, that separates the application logic from the user interface
SwiftUI	a user interface toolkit developed by Apple
UIKit	a framework provided by Apple for developing user interfaces in iOS using the Swift programming language
View	the user interface that displays the data and allows the user to interact with the application
View Model	the intermediary between the Model and the View
Xcode	IDE developed by Apple for macOS, used for developing software for macOS, iOS, watchOS, and tvOS platforms

DESIGNATIONS AND ABBREVIATIONS

Following designations and abbreviations are used in this work:

API	Application Programming Interface
CIS	Commonwealth of Independent States
DFD	Data Flow Diagram
IDE	Integrated Development Environment
IT	Information Technologies
MVVM	Model-View-ViewModel
SD	Standard Deviation
UI	User Interface
US	United States of America
UX	User Experience
VM	View Model

INTRODUCTION

Work relevance

The lack of a competitive cooking app offering features similar to those of Western mobile applications is a significant gap in the IT field of CIS countries. This is especially true for Kazakhstan, where people primarily rely on social media platforms like Instagram, YouTube, or TikTok to find inspiration for their culinary endeavors. Unfortunately, these platforms do not provide a structured and user-friendly interface for finding and organizing recipes. Similarly, websites offering creative meal ideas often lack the necessary aesthetics, structure, and interaction between the recipe author and the user, leading to frustration and dissatisfaction. As a result, many people may opt for food delivery services rather than cooking at home. To counter this trend and maintain people's desire to cook and eat at home, it is essential to develop an app that offers the convenience and technological advancements required to meet the needs of users. Such an app would fill the current technological void in the CIS countries and provide a platform for sharing ideas, inspiration, and lifehacks while fostering a community of self-made and professional cooks.

Goal of the work

To provide users with a valuable tool for their culinary pursuits satisfying social and technological requirements. With contemporary design solutions and a high range of necessary features, and convenient in-app navigation, the app simplifies recipe discovery and fosters a sense of community around cooking making the population boost their personal experience in cooking by deeply exploring their potential food preferences and dietary restrictions.

Research object

Information technologies in the food industry, especially the cooking field.

Novelty of the project

This application is a combination of all the features that could be missing in other cooking systems. There are no completely new features, but it will be much more convenient for the user to use only one tool at hand in each cooking process rather than jumping from one website to another in search of ideas that would satisfy all requirements. As an example, it is essential to have different language support since popular existing cooking systems are mainly for the English-speaking population infringing on CIS people. Also, pleasant design with convenient in-app navigation is a big gap in many cooking apps, so it must provide people with the aesthetics of recipes and a high-level user experience. These features are only a small portion of all system functions that must be in the app.

Research methodology

The mixed research approach is appropriate for investigating the cooking

field as it allows for a comprehensive exploration of the topic from multiple angles. Qualitative research using interviews can provide in-depth insights into the experiences and perspectives of experienced home cooks such as mothers and grandparents. Interviews may focus on recipe development, ingredient selection, cooking techniques, and presentation. Additionally, interviews can also provide valuable information on current challenges and trends in the industry.

On the other hand, quantitative research using surveys can provide a broader understanding of the cooking habits and preferences of a larger group of people. The survey can be targeted toward culinary enthusiasts, home cooks, and other individuals interested in cooking. It may include questions about their cooking frequency, preferred cooking styles, favorite ingredients, and sources of recipe inspiration. Surveys may also explore the accessibility of cooking resources and tools, including the availability of language support, the quality of user interfaces, and the effectiveness of current cooking apps.

By combining qualitative and quantitative research methods, the project team can obtain a complete understanding of the cooking landscape and the needs of its target audience. The results can then inform the design and development of a cooking app that addresses the gaps and challenges identified in the research.

Practical relevance of the work

The project is significant to encourage healthy eating since it can offer a variety of healthy and delicious recipes that stimulate users to cook and eat more nutritious meals. People will know how and what they cook, and they will be aware of the ingredients they add to their meals excluding the food components with less nutritional value. This can help combat the rise of diet-related health problems and promote healthier lifestyles.

Furthermore, a cooking app can help users save time and money by providing them with easy-to-follow recipes simplifying the process of searching since the app will recommend a wide range of food recipes. This can help users avoid wasting money on unnecessary food purchases and deliveries and reduce the amount of time spent planning and preparing meals. Another important point is convenience, i.e. users have a vast library of recipes at their fingertips, accessible from anywhere and at any time. Eventually, the app can offer individuals a social experience by allowing them to connect with other users, share recipes, and get feedback on their cooking.

Objectives

Overall, the objectives of the cooking app project are to provide users with a comprehensive and engaging platform for exploring and discovering new recipes, while also providing helpful information and features that make cooking more enjoyable and accessible.

- 1 Creating an intuitive and user-friendly interface: The app should be easy to

navigate, with a clean and visually appealing design. It should provide an enjoyable and seamless user experience that encourages users to engage with the app's content.

- 2 Offering a comprehensive recipe database: The app should feature a diverse range of recipes that cater to various dietary preferences and skill levels. This will provide users with a comprehensive collection of recipes to choose from and keep them engaged with the app. The app should include options for different dietary needs and restrictions.
- 3 Allowing users to save and organize recipes: Users should be able to save their favorite recipes to a personal recipe box and organize them into categories. This will enable them to quickly access their preferred recipes and keep their recipe collection organized.
- 4 Providing accurate and helpful information: The app should provide accurate and detailed information about each recipe, including nutritional information and cooking instructions. This will ensure that users have all the information they need to make informed decisions about what they eat and how they cook.
- 5 Facilitating social interaction: The app should allow users to connect with other users, share recipes, and rate and review dishes, fostering a sense of community around cooking.

1 MARKET ANALYSIS

1.1 Background

Cooking is a part of daily routine that influences human life. Considering its definition, it is assembling and transforming different ingredients to produce a meal. However, it is not only about the simple procedure of food production. In a more profound understanding, it is a complex activity that requires people to have the expertise and an extensive range of skills and tools to prepare food and plan the process within one's environment, budget, time constraints, and so on [1].

There is a high significance of cooking that is well-known in modern life. Specifically, home cooking is one of the approaches to a healthy lifestyle since it impacts improved diet quality and prevents obesity and other chronic diseases; it also contributes to the recognition of healthy food [2, 3]. However, people are used to food prepared away from home due to today's fast-paced world and the development of food delivery technologies, placing cooking aside. The American lifestyle is a prime example of how people consume fast food instead of homemade meal: even in the 2000s, their caloric intake was almost twice that of 1970s [4], meaning these figures are only increasing and will continue to show an upward trend in the future. Thereby, it is a problem that can be passed on to future generations if nothing is undertaken.

As mentioned, technologies related to ordering food online are in high demand, and one of the reasons why people do not have a balanced diet and satisfactory health indicators since it is much easier to make an order than to cook. Apparently, cooking requires skills, time, and budget [1], and it is challenging for someone to prepare food without sufficient practice and background. Hence, people make their decisions, not in favor of homemade meals. On the other hand, it allows for acquiring new knowledge, finding a new community, or saving the old one improving relationships since cooking traditionally includes many stages, starting from grocery shopping and culminating with gathering around one table, that can involve many people such as family members and friends [5]. Furthermore, it helps maintain good nutrition that prevents diet-related disorders [6] and issues with mental health since, while cooking, people can feel relief in their nervous system and be emotionally happy because they can succeed in making something tasty and delicious demonstrating their progress [7]. Eventually, cooking develops creativity; when there are few ingredients, individuals should find a solution, thereby daring themselves [8].

1.2 Role of IT in cooking field

To increase the engagement of the population in cooking, it is necessary to combine modern technological advancement and regular cooking to make it

possible to satisfy the demands of contemporary realities. Numerous web and mobile services with inspiration and ideas can easily make every meal delicious, interesting, and distinct [9]. However, one can give up using these tools before starting due to several reasons. First of all, they always pay attention to recipes with ingredients that are already on hand, so if there are many, not ordinary components, it can be challenging to start. Moreover, users of cooking apps appreciate time-efficient and budget-friendly recipes since they have many other home and work responsibilities, so it is valuable to follow short instructions to have a great result. It is also noteworthy that many families with picky-eating children want different food, so it is impossible to cook everything that could either cost expensive or have different ingredients in it. In other words, it is significant to have recipes that consist of most products already present at home. Furthermore, many apps require subscriptions which causes an unpleasant experience since it is impossible to access the whole app content making it to some extent useless. People can see only a limited number of recipes which destroys their perception of the cooking app since they could consider someone's advice or recipes from social media more appealing due to its free. So, there is no sufficient quantity of justification for payments for the cooking app [10]. Another persuasive fact is the offline mode of the apps. Namely, sometimes the willingness to cook something can be spontaneous while shopping, but apps are not available because of poor Internet connection in grocery stores making these apps useless when needed. For example, there is much evidence of Internet connectivity problems in Kazakhstan that already was a reason for providers' fining in 2022 [11]. Consequently, the necessity of offline mode is only confirmed and grows. Finally, design solution also impacts the motivation to cook. Several obstacles can arise while searching for a necessary recipe, such as poor navigation, low-quality pictures and descriptions, lack of aesthetics, and so on [12]. Thereby, cooking technologies can both appeal to and alienate people from cooking.

To improve the current situation of cooking apps, it is decided to develop a brand-new mobile app that will meet the users' requirements. These features are noticed while the literature review, in other words, market analysis. Authentic reviews of the users and app documentation are explored, and also there must be a trial period for some popular apps with high-rating on-app markets to fully inspect their functioning. Consequently, they will be used as a reference.

1.3 Advantages of mobile applications

It is important to highlight the common advantages of mobile applications to justify their development. The first obvious benefit is easy access whenever and wherever the user needs it. Phones and tablets are vital to human life, so most people have gadgets to communicate and download necessary information and apps. It is much easier to open the app and check for the required data

than open a browser and search for the recipe getting either good or bad results repeatedly. It takes much more effort and time. Thereby, this fact is the most powerful advantage over websites. Also, it is possible to access apps offline, unlike websites [13].

Another valuable positive side of the apps is notifications. It is easy to receive new information instantly since all notifications come directly to the phones. Compared to websites, the notification system in the apps is more convenient since push notifications are sent only to people who installed the app, so the email box will not be clogged, but users interested will see any updates happened on their account, one-time users will not be distracted by messages from the cooking websites. Also, it is effortless to activate push-notifications from the app, just need to accept them by clicking one single button in the app, whereas websites require a subscription for updates, so it needs your email, and, sometimes, it is hard to unsubscribe [14]. Thereby, it is better to use an app.

Moreover, apps outweigh websites due to the ease of in-app navigation. Apps are initially dedicated to phones, so their navigation is much easier and more understandable than navigation on responsive/mobile websites which sometimes display incorrectly. Consequently, apps prevail over websites. Besides, apps allow customization through different surveys and can memorize certain settings without authorization by linking them to the device directly, whilst websites cannot do something similar because of this they need users' login to provide custom content [13]. Thus, apps make every user's experience more specific and unique. Ultimately, ads are embedded in apps more organically than in websites since they can be closed and it is always possible to find a way to close them, whereas websites often have such a bug when an ad covers the whole content that the user is unable to remove. Also, ads on websites are more intrusive as well as recommendations to register or sign in. As practice shows, apps are more ad-friendly than web applications.

In summary, apps are a preferable option based on the above arguments. They are convenient and easy to use, so it is evident that individuals vote in favor of mobile applications.

1.4 Literature review

Currently, people tend to make their life easy, comfortable, and full of joy without domestic issues. It is understandable since it is the era of technologies that can provide individuals with all necessary life needs in a short time and without much effort placing daily routines aside like cooking [5]. For example, food delivery substitutes the traditional cooking process. However, as appealing as it is, people lose the authentic meaning of life, and their perception also changes. Thereby, to return to their past interest, it would be preferable to combine daily routine with nowadays circumstances in a different way: make a good app with a

variety of food recipes from all over the world with a pleasant design and other significant features to attract as many people as possible.

There are numerous applications with recipes on the market, but each of them is missing at least one function that affects the level of users' engagement in the process. The reason for this situation might be a focus more on profit and a minority of the world population. For instance, most applications require a subscription to see the complete content; if there is no subscription, the quality of design solutions and aesthetics decreases. Eventually, people do not consider cooking apps alluring.

To understand what the future app must include, it is crucial to compare existing applications, identifying their benefits and drawbacks. The analysis of current technologies helps to improve and develop a competitive product.

1.4.1 User Experience

The logic of the app, its navigation, and overall representation relate to the initial steps of the app development process that make its foundation. In other words, an inconvenient app is useless since it induces neither inspiration nor willingness to use it. More specifically, it can cause disappointment and nervousness in people since it might be hard for the user to find necessary things and understand how to use the app.

Considering the Japanese cooking application, Cookpad does not have a function that saves recipes by category. For example, if users want to save a cake recipe, it must be placed in the dessert folder in the account. According to user reviews in the App Store and Google Play, it takes much time to open the desired recipe and start cooking [15, 16].

However, such an app as Kitchen Stories, developed in the US, allows users to create mood boards to save recipes as they want [17]. Another example is Yummly which is also made in the US and already automatically divided by category [18]. Also, these collections can be edited, shared, and formed, namely, if there is no category collection that the user needs, it is allowed to create a new one. Therefore, they provide their users with convenience.

1.4.2 User Interface

In today's fast-paced world, the importance of a visually appealing design cannot be understated, as it attracts and retains user attention. The design is not only about aesthetics but also the overall user experience. The design of a cooking app must be visually pleasing while being functional and easy to use. Cookpad's design has been criticized for being too simple, with no regard for aesthetics. The food photos are not taken professionally, and this results in unappetizing images.

On the other hand, Kitchen Stories, Epicurious, and Yummly have successfully managed to create apps with visually appealing designs that meet aesthetic

requirements. These apps have high-quality images, videos, and overall design, which are appropriate for their style. They provide an enjoyable user experience, with step-by-step instructions that are both creative and descriptive. This ensures that the user is engaged throughout the cooking process, resulting in a positive experience and better user retention.

1.4.3 Subscription

App Development is an efficient way to discover smart and helpful solutions for communities, and it is a business that can have customers and profit. So, as businessmen, developers try to be beneficial in both directions: for customers and themselves. However, it frequently brings discomfort to users due to intrusive subscriptions, covering the whole screen area to make users unable to see anything on the app or giving limited access to content posted in the app. As an example, Epicurious, developed in America, does not provide any possibility to see what is inside because of the subscription offer. Even if there is only one-use intention, it will still require subscribing [19]. Thus, if there is no subscription, the user will not be able to discover anything in the app.

Moving on to limited-access apps, such apps as Yummly allows seeing some recipes and a partial description section of the recipe reducing the number of options and desire for healthy eating since nutrition facts are locked, so people cannot track their food consumption. Consequently, it is not convenient to have both free and fee-based recipes in their feed confusing while cooking.

Kitchen Stories and Cookpad exceed their competitors because they share full content for free without a mix of locked and unlocked recipes making the user experience more comfortable. Nevertheless, users can pay to access a wider range of recipe options.

1.4.4 User's Interaction

In addition to providing a platform for users to discover and explore new recipes, the community aspect of a cooking app is also essential. By creating a community of self-made and professional cooks, users can share ideas, inspiration, and lifehacks to make the cooking process more time-efficient and enjoyable. A strong community can also help to build trust and credibility in the app's content, as users can rely on the experiences and feedback of others when deciding whether to try a new recipe.

Kitchen Stories and Cookpad are two examples of cooking apps that have successfully implemented community features. These apps allow users to interact with each other through comments and ratings, enabling users to provide feedback on the quality of recipes and share their own experiences. Users can also add new recipes with full descriptions and instructions, expanding the app's database and offering a wider range of options for other users to explore.

However, it is important to note that some apps may have low-quality verification strategies, as is the case with Cookpad. Some users have reported fake recipes and poor image aesthetics, which can be a significant drawback for users seeking reliable and trustworthy content.

Other apps, such as Epicurious and Yummly, do not have a community feature, at least not without a subscription. Premium accounts can provide access to additional functionality, such as the ability to save and organize recipes, create shopping lists, and receive personalized recipe recommendations.

Overall, incorporating a community aspect into a cooking app can enhance user engagement and provide a platform for users to share their knowledge and experiences with others. However, it is essential to ensure that the app has a reliable verification strategy to maintain the integrity of the content and build trust with users.

1.4.5 Customization and Adoption

Many popular cooking apps are dedicated to Western and European parts of the world, skipping CIS countries and their national dishes, ingredients availability, etc. Also, apps, made in the USA, often use their measurement system (inches, oz, Fahrenheit) that is challenging to others to cook, following recipe instructions.

Cookpad is the only app that supports customization and adaptation, specifically after the selection of the country, it makes feeds regarding user choice. It is available in more than 70 countries [20]. For example, if the user selected Russia and any other CIS regions, the app will mostly recommend such food as Borsch, pilaf, vareniki, and others. If a European country is selected, pizza, pasta, and seafood will be suggested to the user. However, users can still find food recipes not related to their location. Also, it has both measurement systems in inches and centimeters. It is also important to mention that it will not be available in CIS countries soon. Hence, there is a huge need for the development of a new app.

Kitchen stories, Yummly, and Epicurious cannot fully adapt and be customized, they are mainly based on Western and European food, and sometimes it is possible to find some Asian recipes. There is no chance to select a region because of that no customization.

1.4.6 Language

Language options are an essential consideration for any app, especially one that aims to reach a global audience. Unfortunately, many cooking apps are limited in their language options, making it challenging for non-English speaking users to utilize the app effectively. This lack of diversity in language options can be a significant barrier to entry for many potential users from CIS countries, limiting the app's reach and potential impact.

Cookpad stands out in this regard, as it supports approximately 30 languages, making it accessible to people from many countries and regions around the world [20]. However, it is important to note that political issues have limited Cookpad's availability in some regions, such as CIS countries.

Kitchen Stories is another app that has made an effort to translate its content into multiple languages, though it currently supports only three. In contrast, Yummly and Epicurious are primarily geared towards the English-speaking population, with limited support for other languages.

1.4.7 Offline mode

Frequently, people go to grocery stores to purchase all the necessary food to cook, for example, lunch. As it is a century of technology, people are used to using notes on their phones instead of a hand-written list of groceries. However, they mainly do not take any notes; they directly use ingredient lists presented in the cooking apps, which is sometimes challenging. According to user reviews, in supermarkets, the Internet connection is poor, so it is impossible to view the list in online cooking apps, it is necessary to always look for the spot where the connection is relatively good [12]. Eventually, it is time-consuming, and users give up cooking something new and fancy in favor of old recipes they perfectly know.

Among all the cooking apps represented, there is no offline app; they work only with stable Internet connectivity.

Conclusion

Analysis of the current app market showed a significant gap in the cooking field that cannot be left. It is crucial to inculcate a habit of home cooking in people to increase their health level, save money and unite all family members again [2, 3]. In other words, it is necessary to develop a new cooking app that could show individuals that cooking is interesting and full of creativity.

This diploma project presents an application that includes a modern UI/UX design that eases the process for users to navigate, find necessary recipes, etc. Also, the app will be free of subscription, so users can see all the content without any obstacles. Of course, it provides users with the ability to add new recipes and interact with other users, but their recipes must be verified before posting to avoid disappointment with fake information and non-aesthetic content.

Moreover, the app needs to cover CIS countries by supporting English, Russian, and Kazakh languages in the beginning with the potential to broaden the range of the languages. Furthermore, the app should be customizable for every country listed to provide users with their national and international food.

2 IMPLEMENTATION OF THE PROJECT

2.1 Methodology

2.1.1 Researcrh

To elaborate on the mixed research methodology proposed, it is worth discussing the advantages of using both qualitative and quantitative methods.

Qualitative research involves collecting non-numerical data, such as interviews, focus groups, and observations, to gain an understanding of people's experiences, attitudes, and behaviors. This method is useful for exploring new topics, generating hypotheses, and gaining in-depth insights into complex phenomena. Qualitative research can also be helpful in identifying trends and patterns that can be further studied using quantitative methods.

Quantitative research involves collecting numerical data through surveys, experiments, and statistical analyses. This method is useful for testing hypotheses, establishing cause-and-effect relationships, and measuring variables. Quantitative research is also beneficial in providing generalizable results that can be applied to a larger population.

By combining both qualitative and quantitative methods, the researchers can achieve a more comprehensive understanding of the cooking app field. The qualitative method, such as the interview, will allow the researchers to discuss the questions with people interested in the cooking process who can share their experiences and perspectives to explore the target audience's needs, preferences, and experiences in-depth and current market options precisely. This information can be used to develop a more targeted survey questionnaire for the quantitative research phase.

The quantitative research phase, such as surveys, will allow the researchers to collect data from a larger sample size and analyze it statistically. This method will provide more objective and generalizable insights into the cooking app field's trends, preferences, and behaviors.

Overall, the mixed research methodology proposed can provide a more complete understanding of the cooking app field, enabling the development of a more targeted and user-friendly app. The question list from appendix B is for a qualitative approach.

a) Data Collection

As a qualitative method, the interview was selected. In this study, 10 respondents with sufficient cooking experience, who cook almost every day and seek changes and improvements in the process, were interviewed. It was important to note that all respondents were 25 years and older, mainly with families to whom they cook and demonstrate their proficiency level. The interviews were conducted offline, which took about two weeks to complete since participants are from

different cities, and it was time-consuming to note all answers to open questions. However, the in-depth answers and explanations provided by the respondents were valuable in understanding their needs, preferences, and pain points in cooking.

The survey, on the other hand, provided a more general picture of the cooking app field and was picked as a quantitative approach. The survey was conducted for 2-3 weeks and involved students of Astana IT University who were less experienced in cooking but more proficient in working with technologies. The survey questions were the same as those used in the interviews but with answer options to graph the results and see the big picture of the case. The answers from the survey were analyzed to determine the functionality and design of the app. Some features were changed during the design and development processes to meet the requirements of the target audience. There was high importance to see their opinion and vision on the cooking field technological progress.

b) Resources and Tools

To create a cooking app, data collection is an essential step in understanding user needs and preferences. A suitable approach for data collection could include conducting surveys to gather feedback and insights from potential users. There are several software programs that helped to perform the research process, especially the survey.

Google Forms is an online tool that allows people to create and distribute different forms and surveys with a real-time response analysis. So, it offers users customizable question types, survey templates, data analysis tools, and customization adding pictures, personalized descriptions, and question logic making the survey interesting and showing other people the survey's owner's involvement. Also, the main feature is an automatic summary of the question results with graphs that can be downloaded as an Excel file [21].

Excel is a spreadsheet software program developed by Microsoft that helps to analyze data using formatting, calculations, and formulas. Thereby, the wide range of Excel features will examine the data from Google Forms to see the potential pattern of the answers and all respondents' logic and intentions [22].

Eventually, these tools can help identify patterns and trends in the data and use the insights to inform app development. Thereby, they either confirm or reject possible hypotheses made for the research.

2.1.2 Development

To create an iOS cooking app, a suitable technological stack could include Swift and SwiftUI for building the app's user interface and functionality, Firebase for backend services such as authentication, database management, and cloud storage, CocoaPods for managing external libraries and dependencies, and an API for accessing data such as recipes and ingredient information.

Swift is a powerful and intuitive programming language that allows developers to create native iOS apps with high performance and seamless integration with Apple's ecosystem. SwiftUI is a declarative framework that simplifies the process of building dynamic and engaging user interfaces with reusable components and efficient rendering. To recreate conceived UI/UX design, SwiftUI is a suitable framework, unlike UIKit. Thereby, the appropriate IDE for developing the IOS app is Xcode which enables developers and users to see changes and results in a real-time through interactive mockups.

Firebase provides a scalable and secure backend solution that allows developers to add essential services such as authentication and a real-time database to their app without needing to set up their infrastructure. With Firebase, developers can easily handle user authentication, store user data, and media files, and implement real-time updates.

CocoaPods is a dependency manager that simplifies the process of integrating third-party libraries and frameworks into the project. By using CocoaPods, developers can easily search and install popular libraries such as Alamofire for networking or SDWebImage for image caching and processing.

Finally, an API can provide easy access to data sources such as recipe databases or ingredient information. With an API, developers can retrieve data in real time, ensuring that the app always has the latest information and features. An API can also simplify the management of data by providing a centralized platform for data storage and access.

By combining these technologies, developers can create a robust and feature-rich cooking app for iOS that provides users with a seamless and enjoyable experience. The technological stack offers a range of tools and services that simplify app development, enhance performance, and improve user engagement.

2.2 System Overview

The cooking app aims to provide a modern solution to the traditional printed and oral cookbooks that have been passed down through generations [23]. With a wide variety of recipes from all over the world, the app acts as a helpful kitchen tool, providing numerous tips and instructions to users. Additionally, the app seeks to foster a community of passionate cooks who can share their experiences and unique recipes with each other.

To achieve its goals, the project has set several objectives that must be met. Firstly, the app must have a modern and visually appealing user interface and user experience. This includes features such as easy-to-use navigation, an aesthetically pleasing design, and an intuitive page layout. As an example, the Saved page should have sections for organizing recipes, and the app should include filtering and searching options.

Another important objective is to make the app accessible to people from

different countries and cultures. To achieve this, the app must be available in multiple languages. At the development stage, the app should offer at least three language options, and the recipe collection should include dishes from different parts of the world, including Western, Asian, European, and other regions.

Finally, the app should be affordable and accessible to everyone, regardless of their location or financial situation. To this end, the app should be free to download and use, and it should be available offline so that users can access it even without an internet connection. This ensures that the app can be used by people in remote or low-income areas who may not have access to reliable internet services.

2.2.1 System Architecture

The information architecture diagram illustrates the structure and flow of the mobile app, highlighting its main components and navigation pathways. Figure 2.1 presents a sequential progression from the onboarding stage to various tabs and pages within the app.

The onboarding page serves as an initial introduction to the app and greets the user. From there, the user is directed to either the registration or login pages, depending on whether they are a new or returning user. The registration page requires the user to provide their full name, phone number, email, and password, while the login page only requires the user's email and password for authentication. These steps ensure that the user is properly identified and authenticated before accessing the app's features.

Upon successful registration or log-in, the user gains access to the other functions of the app through five major tabs: Home, Categories, New Recipe, Saved, and Profile.

The Home tab serves as the main landing page for the user. It presents a recipe article related to any topic and provides options to explore recent recipes, top cooks, and community recipes. This tab aims to provide users with inspiration and a snapshot of popular recipes and culinary trends.

The Categories tab offers an overview of all available recipe categories. It also includes a search function that allows users to find specific recipes within the various categories. This tab provides easy access to a wide range of recipe options, ensuring users can browse and discover recipes based on their preferences.

The New Recipe tab enables users to create and share their own recipes. It provides a form or interface where users can input the details of their recipe, such as ingredients, cooking instructions, and any additional information they want to include. This feature empowers users to contribute their unique culinary creations to the app's recipe collection.

The Saved tab allows users to save recipes they find interesting or want to revisit later. The saved recipes are organized into sections or categories that

already exist within the app. Users also have the flexibility to add new sections based on their preferences. This tab provides a convenient way for users to bookmark and organize recipes for easy access in the future. It also offers a search function to locate specific saved recipes throughout the entire tab.

The Profile tab resembles a social media profile, displaying information about the user and their culinary activities within the app. It showcases the user's followers and the following list, along with their recipe posts. The tab also includes a notification area where users can view updates, interactions, and notifications related to their profiles and recipes. Additionally, users have the ability to customize their profile by adding a description that reflects their culinary interests and preferences. The settings option within the Profile tab allows users to manage their account preferences, privacy settings, and other app-related configurations.

Overall, the information architecture of the mobile app aims to provide users with a seamless and intuitive experience in discovering, creating, saving, and sharing recipes. The structured flow and organization of the app's components help users navigate through its various features efficiently, enhancing their overall culinary journey.

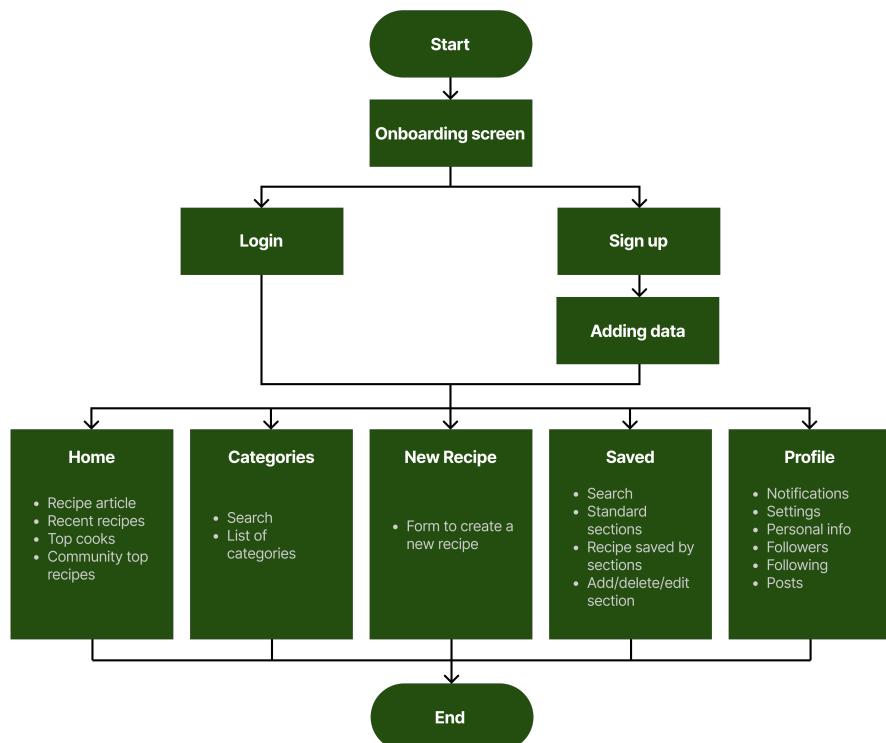


Figure 2.1 – Information Architecture

2.2.2 Data Flow

The data flow in Figure 2.2 illustrates the process of user input, authentication, authorization, and various data outputs within the app.

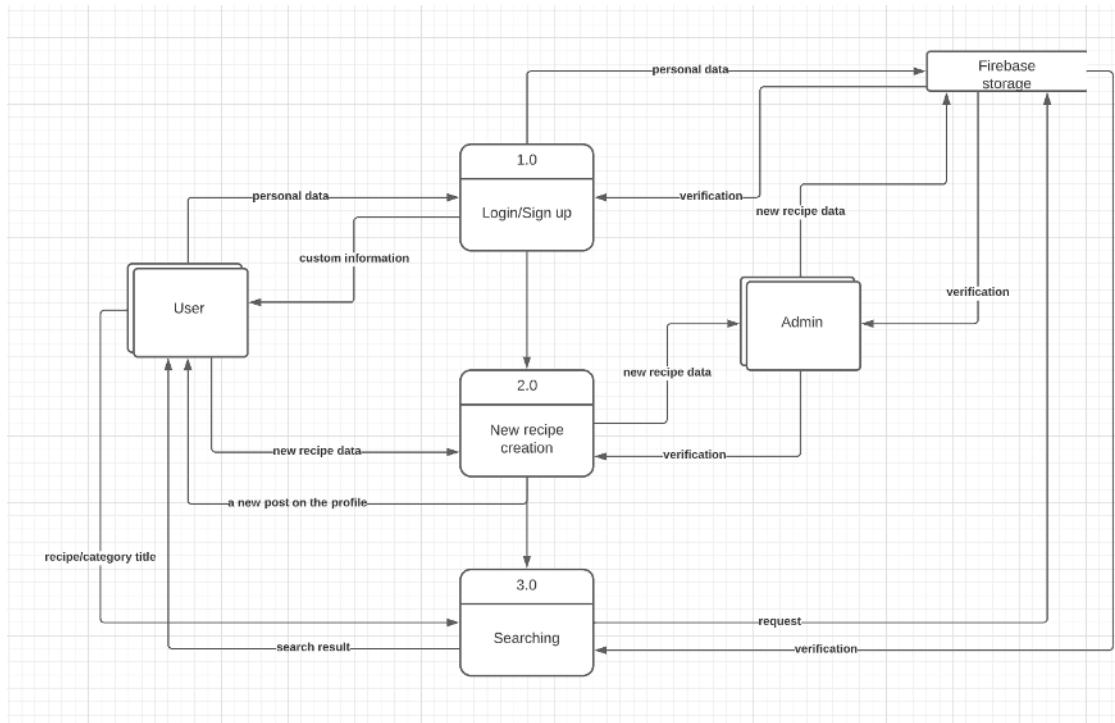


Figure 2.2 – Data Flow Diagram

The user begins by providing input through sign-in and sign-up forms, filling in their personal data. This input data is then sent to Firebase Authentication for verification. Firebase Authentication checks the user's credentials to validate their identity and ensure they are authorized to access the app.

Once the user's identity is verified and they are authorized, they gain access to the app's functionality and data outputs. These outputs include custom recent and top recipes tailored to the user's preferences, posts from people they are following, and their own account data, such as the number of followers, followings, and posts.

When creating a new recipe, the user inputs all the necessary data related to the recipe. This input data is then subjected to verification by both the app's admin and the database. The admin checks the quality and accuracy of the data, ensuring it meets certain standards and guidelines. Simultaneously, the database checks for the presence of similar recipes to avoid duplication. If the recipe passes both verifications and meets the required criteria, it is validated and published. Validated recipes appear in the feed and the user's personal account.

Furthermore, users input data while searching for specific recipes or content. The search word or query is matched against the data in the database. If there is a match, the output is a search results list, presenting relevant recipes or content

that align with the user's search query.

Overall, the data flow emphasizes the importance of user input, authentication, and authorization processes in ensuring a secure and personalized user experience. It also highlights the role of verification in maintaining data quality and integrity within the app. By leveraging Firebase storage and authentication, the app can effectively store user data, validate identities, and provide relevant and customized data outputs to enhance the overall user journey.

2.2.3 Interfaces

For this diploma project, it is crucial to design a specific user interface that provides a high-quality user experience for the cooking app [24]. The partial UX design from Figure 2.4 serves as a foundation for the UI design from Figure 2.3, which includes the application of a suitable color palette in Figure 2.7, relevant images, aesthetic app short logo in Figure 2.5 and regular one in Figure 2.6, and user-friendly text. The goal is to create an interface that is visually appealing, easy to navigate, and aligns with users' expectations and preferences.

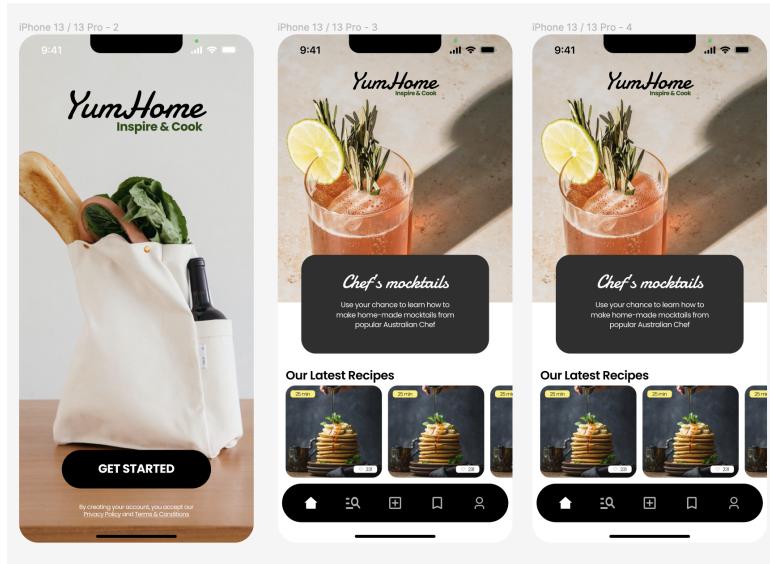


Figure 2.3 – UI design

The logos in Figures 2.5 and 2.6 designed for the app play a significant role in enhancing the overall UI design and visual identity of the application. They are carefully crafted to align with the app's concept, ensuring that they convey the intended message concisely and aesthetically.

The choice of colors in Figure 2.7 in the app's design, particularly the dominant use of green and yellow, contributes to creating a warm and inviting atmosphere. Green is often associated with freshness, nature, and health, which aligns perfectly with the app's focus on promoting healthy eating habits. It evokes a sense of cleanliness and vitality, reinforcing the idea that cooking can be a rejuvenating

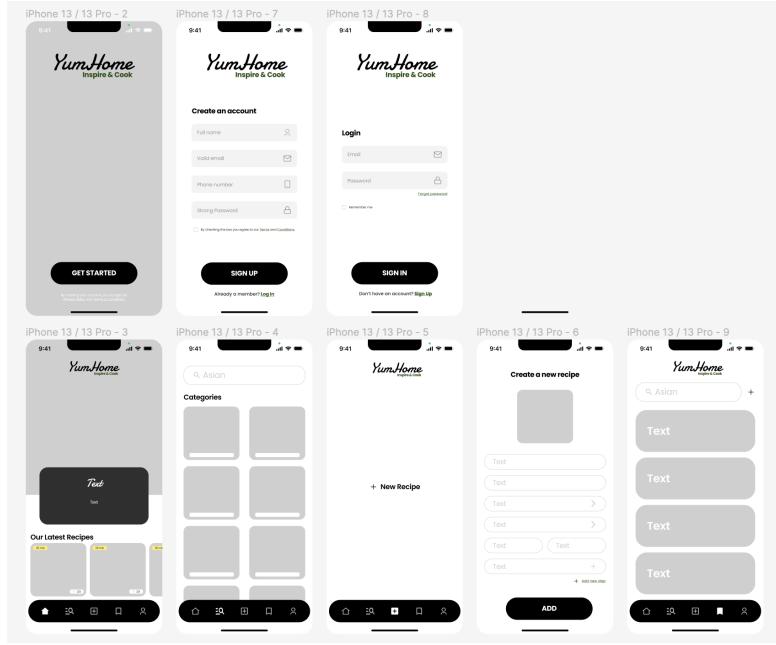


Figure 2.4 – Partial UX design

and enjoyable experience. Similarly, yellow is known for its energetic and cheerful qualities, adding a touch of vibrancy to the app's visual appeal.



Figure 2.5 – The app's short logo

In addition to the color palette, the use of dark and white colors serves as a foundation for the app's layout and structure. The combination of dark and white elements creates a balanced and elegant interface, allowing the content to stand out and be easily readable. The dark backgrounds provide a sense of depth and contrast, while the white accents contribute to a clean and modern look. This harmonious blend of colors ensures a visually pleasing and cohesive user experience.

Overall, the logos and color choices in the app's design contribute to creating a cohesive and visually appealing interface. They effectively communicate the app's purpose and evoke the desired emotions of coziness, cleanliness, and healthy living. By paying careful attention to the colors and visual elements, the app is able to create a visually engaging and inviting environment for users to explore and enjoy their cooking journey.

By focusing on delivering a pleasant design and intuitive navigation, the aim



Figure 2.6 – The app’s logo

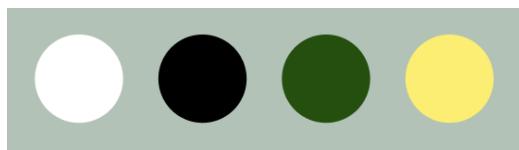


Figure 2.7 – Main color palette

is to increase user engagement and encourage frequent usage of the cooking app. While users have the freedom to choose from various cooking apps available in the market, a well-designed interface can attract their attention and justify the development efforts, ensuring that the app’s goals and objectives are met.

To ensure the app meets users’ expectations and requirements, the design and functionality are based on research results. Users’ feedback on their likes, dislikes, and color preferences is taken into account. By incorporating user opinions into the app’s UI, the risk of failure is minimized, as the design resonates with the target audience.

This diploma project sets several objectives for the cooking app, aiming for a high-quality, aesthetically pleasing, and comprehensive user experience. It is essential to adopt modern mobile app development architecture, adhere to data flow principles, and employ design techniques to achieve these objectives. The initial strategy is to attract the target audience through a positive user experience.

The app’s core components include a robust search function, effective filtering options, an appealing recipe display, and user-friendly recipe posting. Additional advanced features will be explored and described in detail as the project progresses and requirements become more apparent.

In terms of design, the app aligns with users’ preferences and modern design requirements. The chosen color palette, inspired by the respondents’ preferences for green and yellow, creates a strong connection with home cooking. These colors

are associated with coziness and organic food, emphasizing the health benefits of home-cooked meals. By making appropriate associations and implementing a visually pleasing design, the app aims to attract users and encourage their adoption and usage.

2.2.4 Components

The UI components play a significant role in the presentation layer of the app. Figure 2.4 provides a partial representation of the user experience (UX) design, which is subject to further improvements and refinements. In conjunction with the UX design, the UI kit from Figure 2.8 includes essential elements such as the color palette, font selection, and icon set.

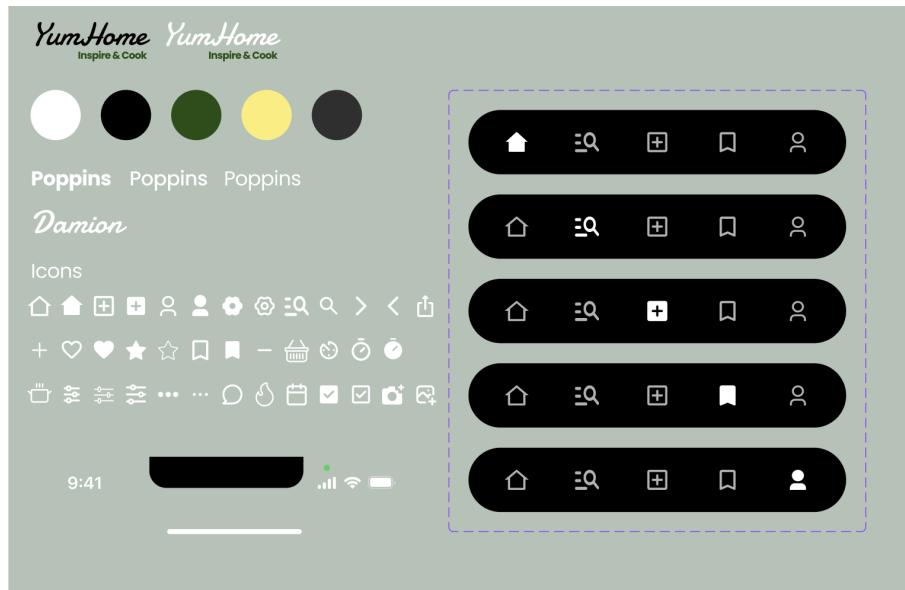


Figure 2.8 – UIKit

The status bar, depicted in Figures 2.8, 2.3, and 2.4, serves as an indicator of the app's authenticity and provides the developer with a preview of how the design will appear on a real device. It aids in the proper layout of other UI components and contributes to a more cohesive user interface.

The tab bar in Figure 2.9 is an essential UI element that facilitates navigation between the five main screens of the app. Each tab is represented by an icon, which visually communicates the functionality associated with that particular tab. By using a tab bar, the app enhances in-app navigation, allowing users to quickly switch between different sections or features.

The search bar in Figure 2.10 plays a crucial role in the app's usability. It enables users to search for specific recipes or categories, providing a more efficient and faster way to access the desired content. The search functionality is accessible in both the categories and saved pages, improving the overall user experience.

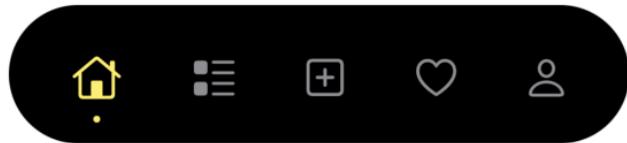


Figure 2.9 – TabBar

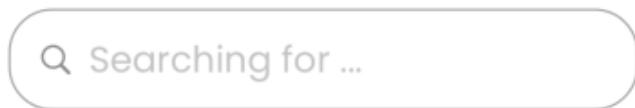


Figure 2.10 – TabBar

Recipe cards, featured in the app's design, include key information such as the recipe image, title, cooking time, and likes. This condensed representation allows users to quickly evaluate the suitability of a recipe, saving them time and effort in decision-making. There are three types of cards for different purposes.

The small one in Figure 2.11 is for displaying the recipes added by the author on his/her Profile page.



Figure 2.11 – Recipe Card Small version

The medium version in Figure 2.12 is needed to represent recipes in their category views.

The large variant of the card in Figure 2.13 is used for demonstrating to users a "Today's favorite" that is picked by the biggest number of likes. All three cards have cooking time amount, number of likes, the image of the food, and its name.

A category card in Figure 2.14 is one of the elements of the Categories view

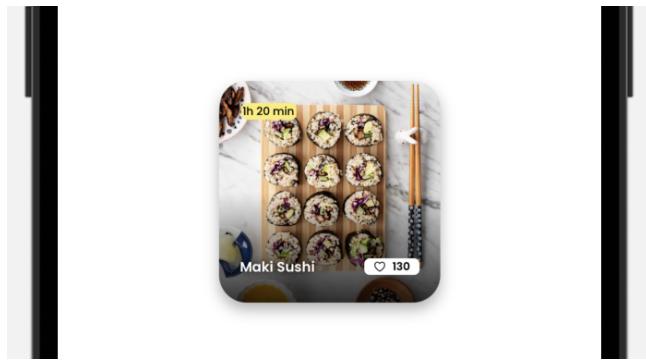


Figure 2.12 – Recipe Card Medium version

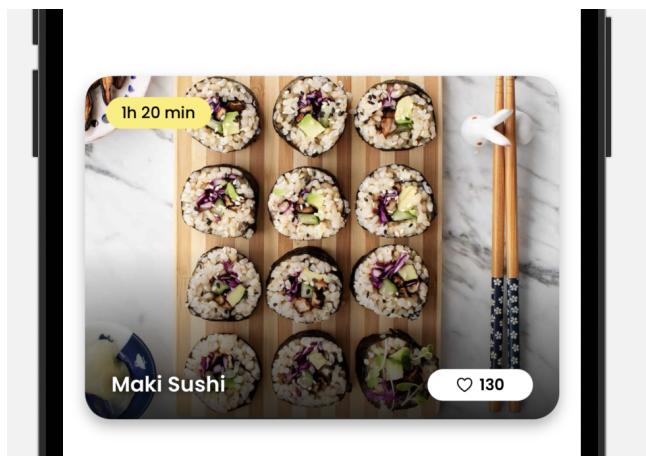


Figure 2.13 – Recipe Card Large version

that reflects by its image the content of each category.



Figure 2.14 – Category Card

A category folder card in Figure 2.15 is one of the elements of the Saved view that reflects by its image the content of each category. Using folders, the user will fast find the saved recipe that he/she needs since it will be exactly known where the recipe is placed.

Sorting options in Figure 2.16 are available in each category. These filters facilitate the process of finding suitable meals based on recipe name, date of post, and rating. By incorporating filtering capabilities, the app empowers users to

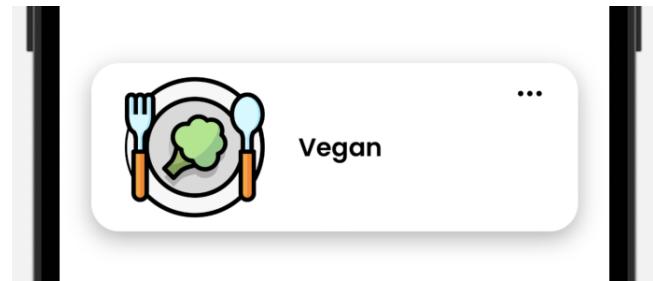


Figure 2.15 – Category Folder Card

refine their search and discover recipes that align with their needs more efficiently.

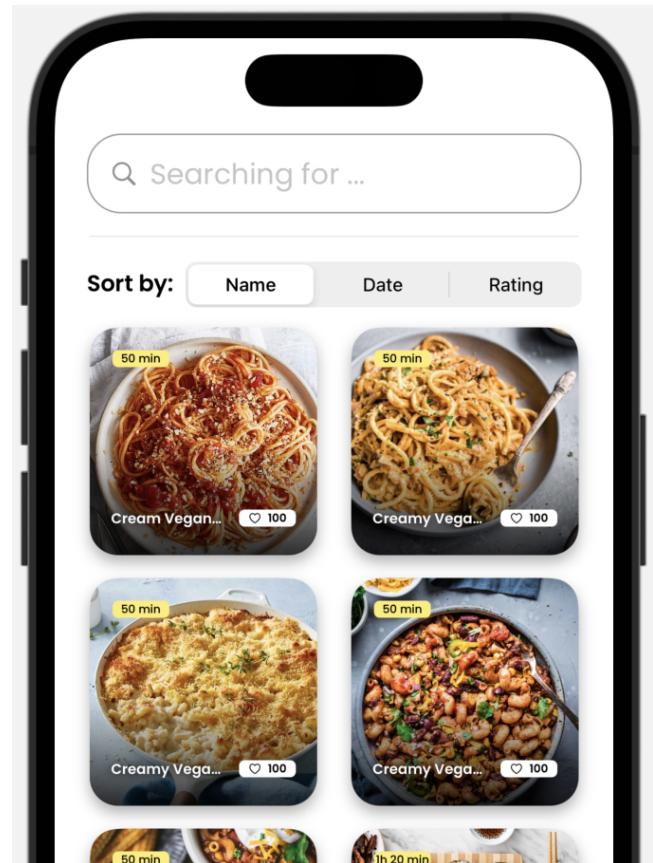


Figure 2.16 – Sorting function

Various types of text fields are utilized throughout the app's design. Keyboard input fields are used in the sign-in and sign-up forms, requiring users to manually enter their data. In the new recipe form, a combination of text fields is employed. For instance, a checklist is presented when selecting the category and ingredients, while a picker appears for specifying ingredient measurements. This diverse range of text input options enhances usability and allows users to fill out forms more efficiently. Figure 2.24 shows what pickers look like.

Different types of buttons are utilized, including primary and tertiary actions.

These buttons serve to guide users on which actions to perform and when. Additionally, button styles such as icon buttons, link buttons, and solid buttons are employed to create visual variety and enhance user interaction. To promote data integrity, the submission button in form fields is disabled when there are empty spaces, ensuring users provide all required information before proceeding.

2.3 Implementation

This section shows the realization of the project programmatically providing necessary screenshots and detailed descriptions.

2.3.1 ContentView

This page serves as the central hub for displaying the app's entire functionality. To fully interact with and explore the app, it is essential to open this file. The page is designed to provide users with a comprehensive overview of the available features and options.

Upon opening the file, users are presented with a visually appealing and user-friendly interface. The layout is carefully organized to ensure easy navigation and efficient access to various sections and functionalities of the app. Users can interact with different elements on the page to perform specific actions and explore different areas of interest.

Opening this file grants users complete access to the app's functionality, allowing them to explore, create, save, and customize their experience within the app. It serves as the gateway to a rich and immersive cooking app experience, catering to users' preferences and culinary interests. The code for this file is in Appendix A

2.3.2 Onboarding page

The onboarding page in Figure 2.17 serves as the initial introduction to the app, where its purpose and key features are communicated to the new user. While the page may appear simple in terms of functionality, its role in creating a positive and engaging user experience should not be underestimated.

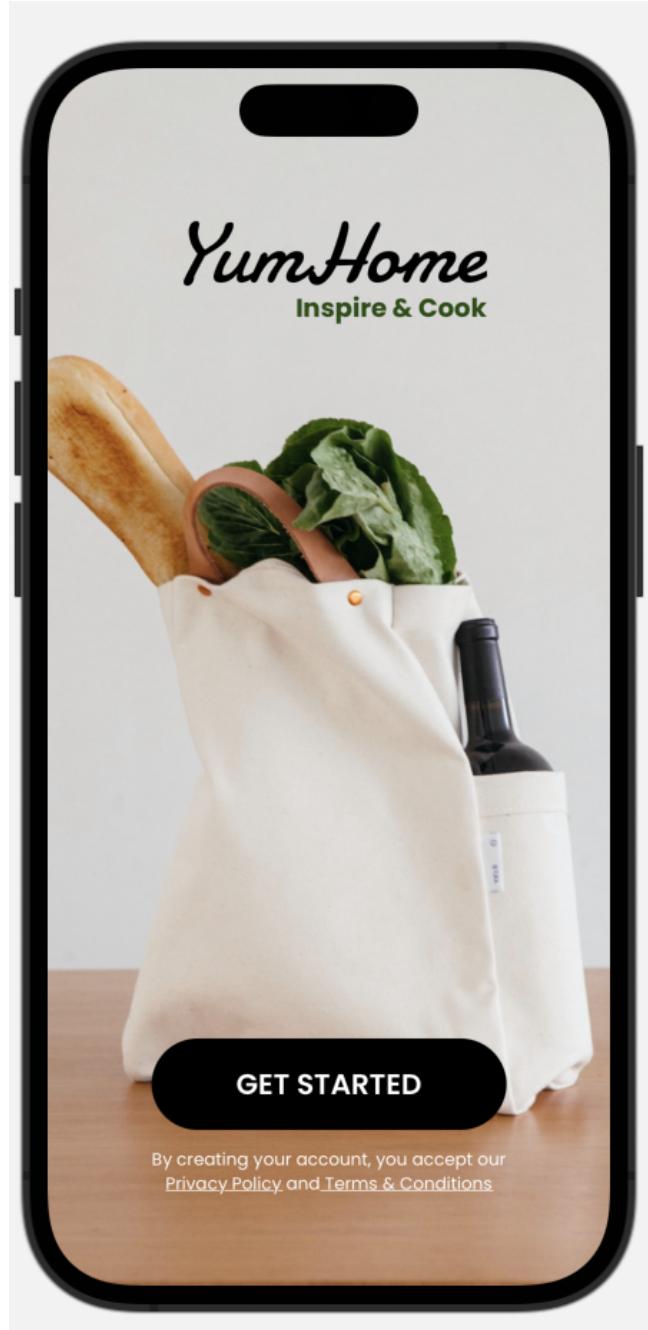


Figure 2.17 – Onboarding page

2.3.3 Login and Registration pages

After the onboarding page, the Login page in Figure 2.18 opens to allow the user to authorize in the app system. The Login page interface is designed with a focus on simplicity and usability. Thereby, its design highlights the main objects of the screen: input fields, logo, and buttons. The page includes several active buttons to facilitate the login process and provide options to the user.

At the bottom of the password input field, there is a "Forgot your password?" button in the form of a link. This button is placed prominently to catch the user's attention in case they have forgotten their password. By clicking

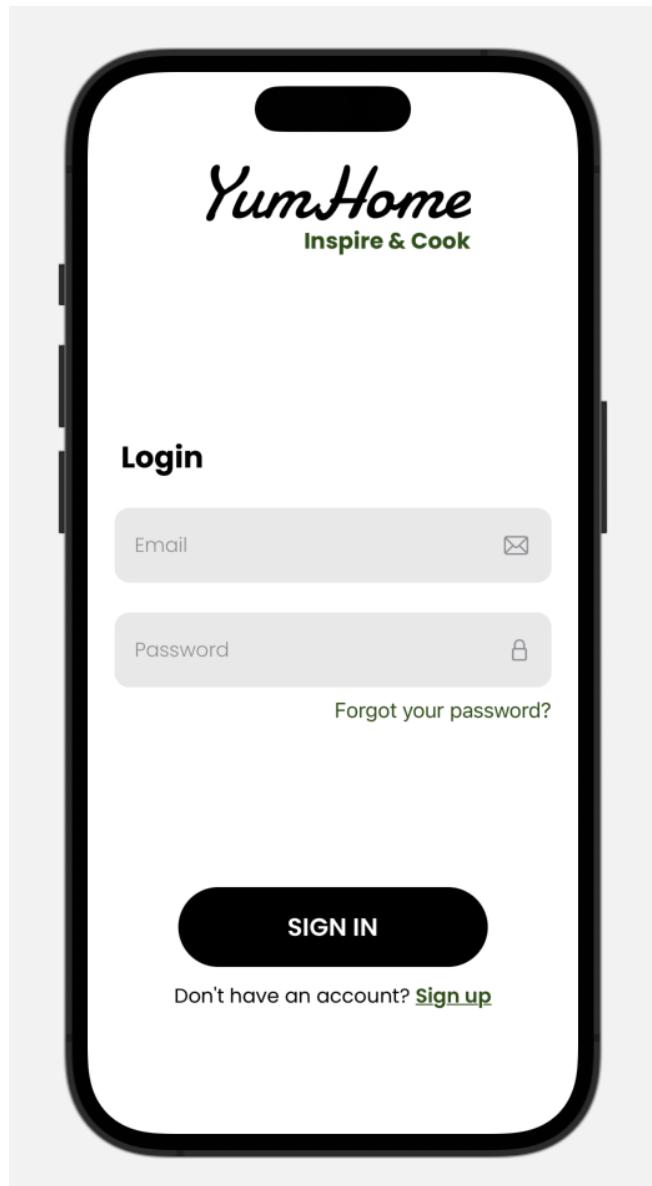


Figure 2.18 – Login page

on this button, users can initiate the password recovery process and regain access to their accounts.

Below the password recovery button, there are two main buttons: "SIGN IN" and "Sign up". The "SIGN IN" button is the primary call-to-action button for users who already have an account and want to sign in. It is designed to be visually prominent, using a large size and a distinct black color to make it easily distinguishable from other elements on the page. The primary button's design ensures that it stands out and attracts the user's attention, encouraging them to proceed with the login process.

The "Sign up" button is a link button that provides an option for users who do not have an account yet. This button is designed to be smaller in size compared to the primary button, and it is highlighted with the brand's green color to make

it visually noticeable but less prominent compared to the primary button. By clicking on the "Sign up" button, users are redirected to the registration page where they can create a new account.

The registration page in Figure 2.19 has a similar design and description the only differences are in additional input fields for name and phone number, and the agreement checkbox toggle button.

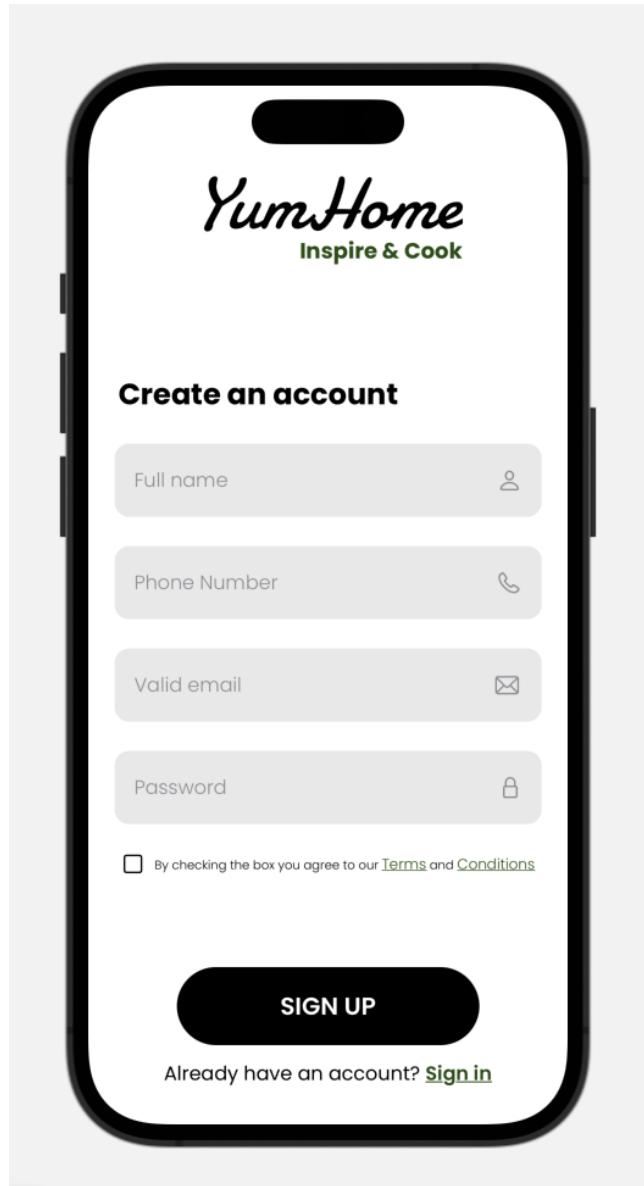


Figure 2.19 – Registration page

2.3.4 Home Page

This page in Figure 2.20 represents the main page of the app that greets the user after authorization. The home section provides users with a personalized feed of recipe articles, recent recipes, top cooks, and community recipes. It offers a glimpse into the latest trends and popular recipes within the app's community.

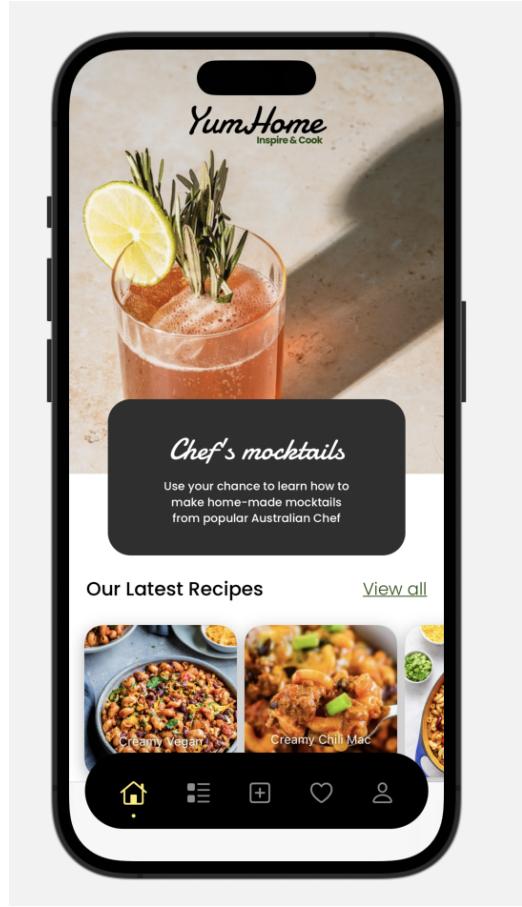


Figure 2.20 – Home page

2.3.5 Categories Page

This section in Figure 2.21 allows users to browse through different recipe categories. They can explore various categories, such as breakfast, lunch, dinner, desserts, and more. A search function is also available to facilitate the discovery of specific recipe categories.

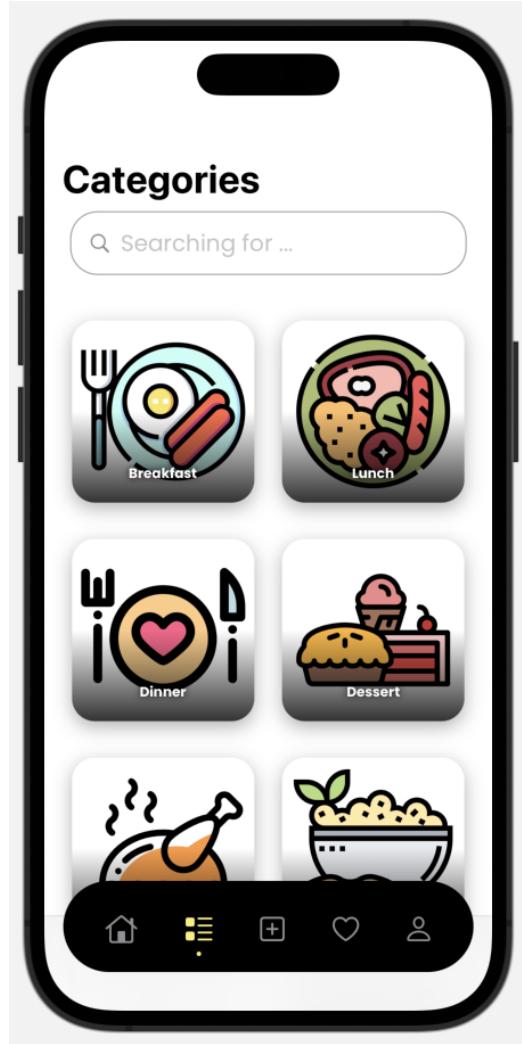


Figure 2.21 – Categories page

2.3.6 RecipeView Page

This page in Figure 2.22 shows how the recipe selected is represented to the user. It is possible to see the recipe picture and name, cooking time, the description of the meal, author name and link to his/her profile, number of servings and reviews, rating, nutrition facts, ingredients, and instructions. Figure 2.23 shows the rest screen.

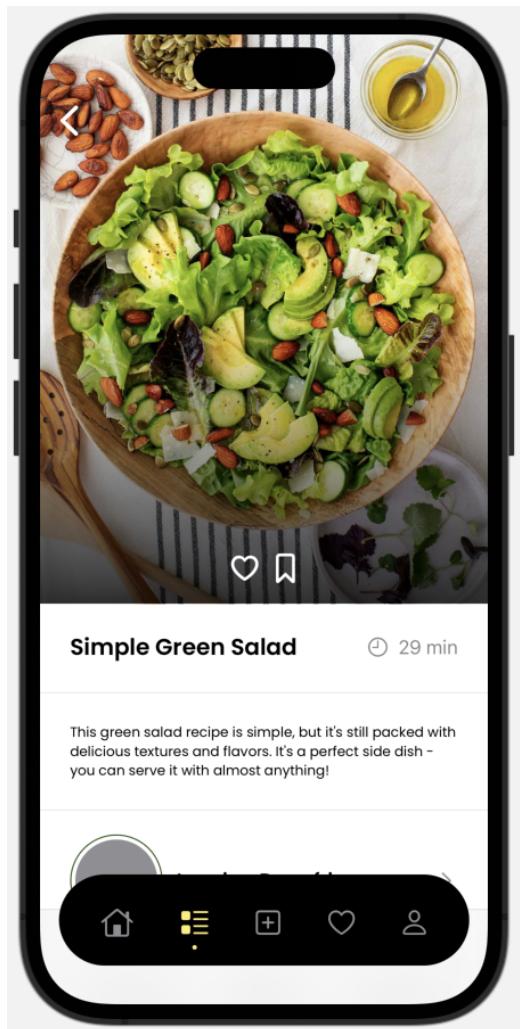


Figure 2.22 – RecipeView page

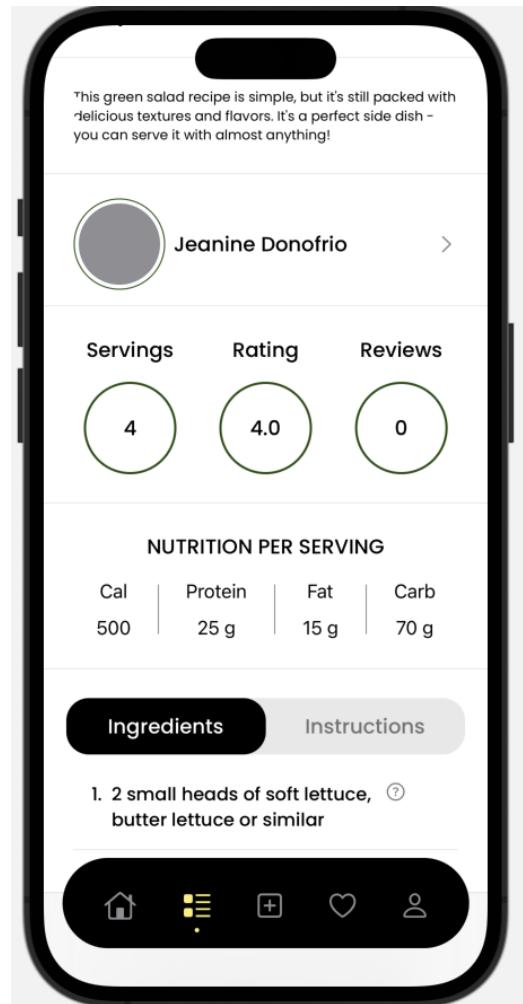


Figure 2.23 – RecipeView page (part 2)

2.3.7 New Recipe Page

Users in Figure 2.24 can create and post their own recipes in this section. The form allows users to input all the necessary details, such as recipe names, ingredients, cooking instructions, and images. Once posted, the recipe becomes visible to other app users.

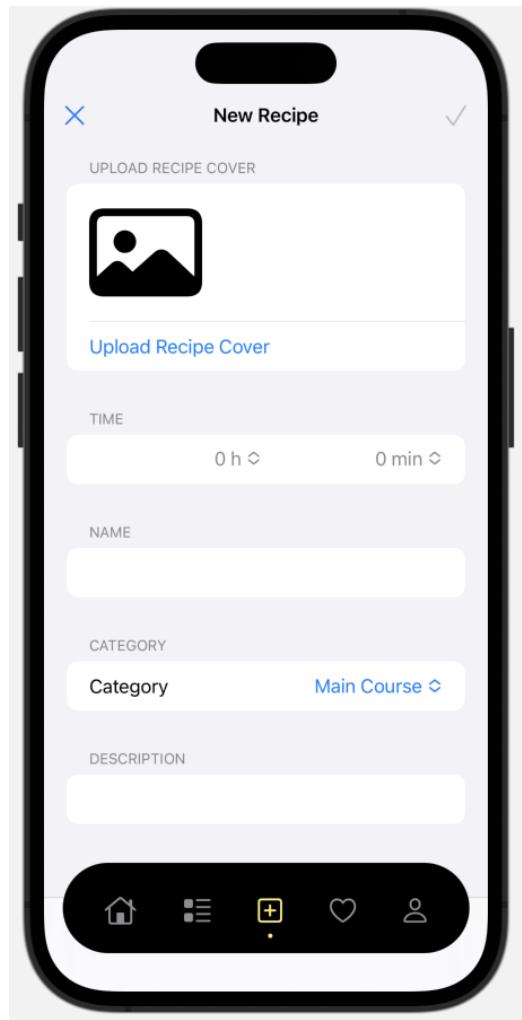


Figure 2.24 – New Recipe page

2.3.8 Saved Page

The saved section in Figure 2.25 enables users to save their favorite recipes for quick access. Recipes can be organized into sections or categories, and users have the flexibility to create their own custom sections or delete existing ones. The saved section also features a search function for easy retrieval of saved recipes.

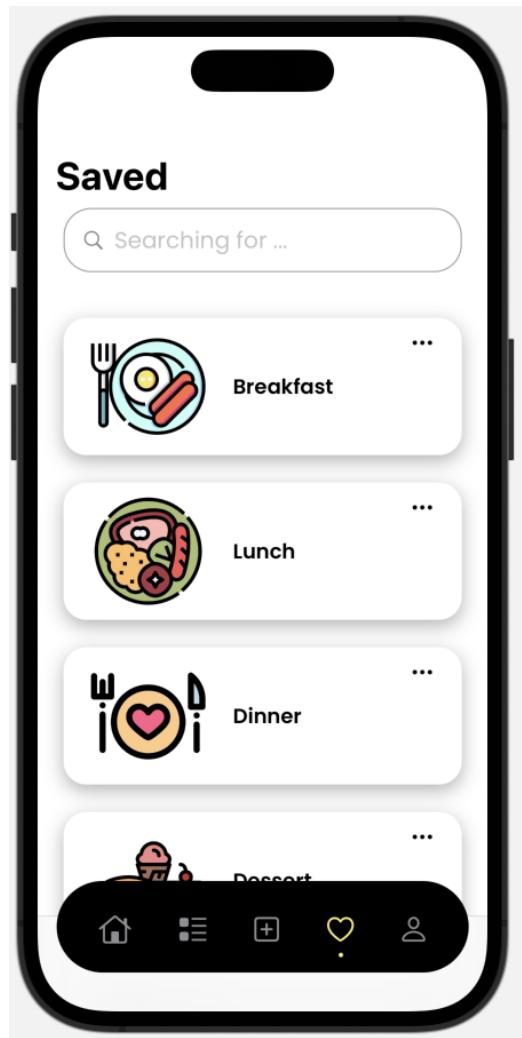


Figure 2.25 – Saved page

2.3.9 Profile Page

The profile page in Figure 2.26 resembles a social media profile, where users can view their followers, the list of people they are following, and their own recipe posts. It also includes user notifications and settings to personalize the app experience. Users have the option to add a profile description and customize their profile settings.

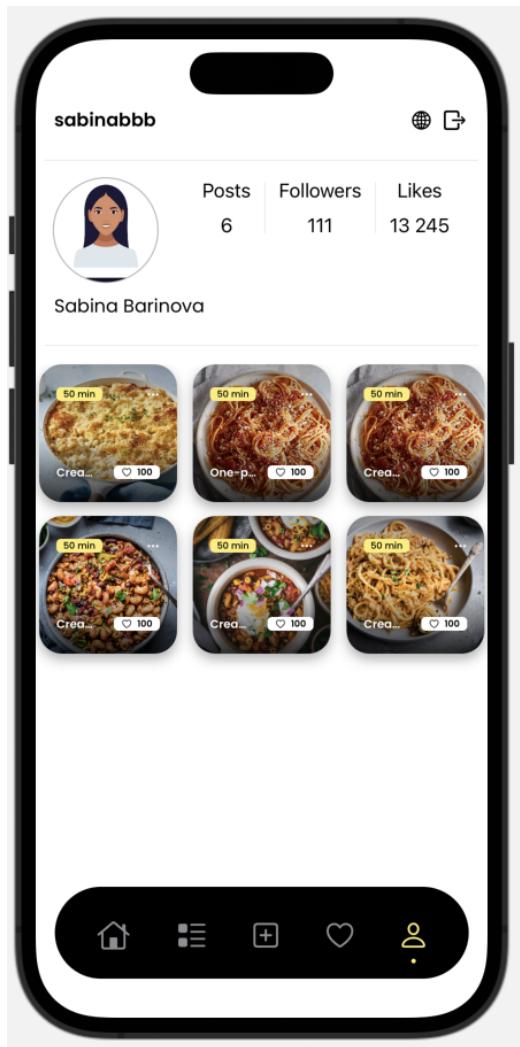


Figure 2.26 – Saved page

2.3.10 Entities

To store data effectively, it is crucial to define appropriate models with the necessary attributes. In the cooking app, several entities need to be stored, including user information, recipe details, comments, categories, and difficulty levels. By creating these models, it becomes possible to establish relationships between entities in the database, ensuring efficient data management.

The Recipe entity is connected to the User entity through a foreign key, specifically the recipe ID. This relationship allows the database to associate each recipe with the corresponding user who liked or saved it. By linking recipe IDs to the respective arrays in the User entity, the app can accurately display the user's interactions with recipes. Also, if recipe creation is considered, each recipe must have user ID as foreign key to establish the relationship. Thereby, the relationship type for recipe creation is One-to-Many: 1 user can have many recipes, but 1 recipe has one author.

Similarly, the Comment entity is linked to the Recipe entity through a foreign key. Each comment is associated with a specific recipe, enabling users to provide feedback and engage in discussions about particular recipes. Thereby, the relationship type for commenting is One-to-Many: 1 user can have many comments, but 1 comment has one author.

In order to establish the relationship between categories and difficulty levels with recipes, their respective IDs are added to each recipe. This association allows the app to categorize recipes and determine their level of difficulty based on user preferences. Thereby, the relationship type for recipe and difficulty is One-to-Many: 1 recipe can have one difficulty, 1 difficulty can be applied by many recipes. Furthermore, the relationship type for recipe and category is One-to-Many: 1 recipe can have one category, 1 category can be applied by many recipes.

By creating these relationships and utilizing appropriate foreign keys, the app's database can efficiently store and retrieve relevant information, facilitating seamless interactions between users, recipes, comments, categories, and difficulty levels. This structured approach to data storage ensures that the app can provide accurate and personalized experiences for its users.

2.4 Results

2.4.1 Interview Results

Participants' characteristics

A total of 10 participants were included in the interview, with an absolute number of females (10). The mean age of the participants was 40.6 years ($SD = 13.6$), ranging from 25 to 61 years. Currently, 8 of them have families including husbands and children. The whole demographic characteristics of the participants are summarized in Table 2.1.

Table 2.1 – Interviewees' Characteristics

Nº	Gender	Marital status	Children	Grandchildren	Occupation	Age
1	Female	Married	✓		Housewife	25
2	Female	Married	✓		Working	25
3	Female	Married	✓		Freelancer	28
4	Female	Single			Freelancer	30
5	Female	Married	✓		Housewife	33
6	Female	Married	✓		Working	49
7	Female	Married	✓	✓	Housewife	51
8	Female	Married	✓	✓	Working	51
9	Female	Married	✓	✓	Working	53

10	Female	Widowed	✓	✓	Housewife	61
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Interview Participants' responses

Question: How often does the respondent cook?

It was found that 9 out of the 10 respondents reported cooking on a daily basis, with a frequency of two to three times per day. However, it is worth noting that one respondent who identified as single stated that they do not engage in cooking activities regularly. Instead, this individual prefers to order food or dine out for their meals. Upon further inquiry, it was revealed that this respondent possesses culinary skills that are utilized primarily for their parents' home gatherings, which occur only occasionally. This suggests that the individual has acquired cooking skills but reserves their application for special family events rather than daily meal preparation. The other details can be seen in Table 2.2

Table 2.2 – Frequency of cooking

Nº	Cooking frequency per day	Cooking frequency per week
1	3/3	7/7
2	2/3	7/7
3	3/3	7/7
4	0/3	0/7
5	3/3	7/7
6	2/3	7/7
7	2/3	7/7
8	2/3	7/7
9	3/3	7/7
10	2/3	7/7

Question: How much time does the respondent spend searching for recipes?

In addition to the cooking frequency, it was observed that about 50% of the women who cook every day invest a significant amount of time in every meal course preparation. On average, these individuals spend approximately 1.2 hours finding the appropriate meal options for all family members.

Furthermore, it was noted that when these people have a food plan for the next three days, the planning process requires even more time. However, only 5 people out of 10 make food plans for the entire week. Table 2.3 depicts the data above in more precise numbers.

Table 2.3 – Time spent on thinking what to cook

Nº	1 meal course	1 day meal course	1 week meal course
1	1 hour	3 hours	1 day
2	1.5 hour	3 hours	0
3	1.5 hours	3 hours	1 day
4	2 hours	0	0
5	30 min	1 hour	5 hours
6	1 hour	3 hours	1 day
7	15 min	1 hour	3 hours
8	30 min	1 hour	0
9	30 min	1 hour	0
10	30 min	1.5 hours	0

Questions: Does the respondent's emotional state change while searching for the recipe?

During the interview, a notable trend emerged among participants from 6 to 10 from Table 2.1 regarding their emotional responses when they are unsure about what to cook. It was found that these individuals tend to experience a higher level of nervousness or anxiety in such situations.

In contrast, the second half of the participants, who were younger in age, appeared to be less prone to experiencing anger or frustration when faced with the challenge of deciding what to cook.

Questions: Does the respondent use any sources for cooking? & What sources does the respondent use for cooking inspiration?

A striking finding emerged regarding the use of social media and online search engines as the primary sources of inspiration for diverse menu ideas among all 10 women respondents. For example, Instagram, Youtube, TikTok, and Google. It was found that each participant relied on social media platforms as their go-to resource for discovering new and exciting recipes, meal ideas, and culinary inspiration.

Furthermore, it was observed that 90% of the respondents' knowledge of simple recipes was sufficient for their cooking needs. These individuals expressed contentment with preparing familiar dishes they were already familiar with.

In contrast, participant 4 who cooked rarely exhibited a different approach. This individual actively sought out new recipes and culinary ideas online, reflecting a desire to explore and experiment with novel dishes.

Question: Are social media and search engines convenient?

In a surprising turn of events, the survey results indicate that all 10 respondents expressed dissatisfaction with the convenience of social media and online search engines as sources of culinary inspiration due to the time-consuming and challenging search process. However, the main feature they (10 out of 10 people) highlight as their favorite is plenty of ideas.

Question: What are the limitations of social media and search engines making them less convenient?

In addition to the previous findings, the survey results highlight a specific concern among 10 out of the 10 respondents regarding the compatibility of social media platforms with their efforts to maintain a healthy lifestyle. They found that social media platforms did not readily provide this information, requiring them to search for it elsewhere manually.

Furthermore, the younger generation (participants from 1 to 5) raised a valid concern about unappetizing pictures on social media platforms. They expressed confusion and dissatisfaction when confronted with unappealing images that failed to represent the successful end result of a recipe.

Question: Does the respondent know any cooking applications?

Among the participants, it was discovered that 2 out of 10 individuals had attempted to download cooking apps in the past, although they couldn't recall the specific names of the apps. Unfortunately, their experiences with these apps were unsuccessful due to the language barrier. Since the apps were in English, a language they did not understand, the participants resorted to using translators to navigate through the app's features.

While the visually appealing food pictures on these apps were enticing, the process of searching for recipes and following cooking instructions became more time-consuming and cumbersome due to the need for translation. They found that some of the given ingredients in the recipes were unknown to them, making it difficult to understand what to add or how to find suitable replacements. This added another layer of complexity to the cooking process and further contributed to the participants' decision to delete the apps from their devices.

On the other hand, the remaining participants were unaware of any cooking applications or had not explored them previously.

Question: What colors does the respondent associate with cooking applications?

In the interview, it was observed that the majority of participants, specifically 8 out of 10 individuals, did not prioritize the color scheme of cooking apps. They did not pay particular attention to the colors used in the app interface. However, a few participants expressed their preference for a green color scheme, associating it with cleanliness, freshness, and healthy food choices, particularly vegetables.

Question: What else does the respondent expect from the cooking

app?

A common sentiment expressed by all participants was their aversion to using complex cooking apps. They unanimously agreed that such apps tend to be time-consuming and overwhelming, especially considering their limited capacity to learn new technological skills. Instead, they preferred apps that were easy to learn and navigate, taking into consideration their age and technological proficiency.

Finally, one noteworthy observation made by the participants was the prevalence of poor or limited internet connectivity in certain areas of Astana and Karaganda. They highlighted that accessing reliable and stable internet connections could be challenging in these regions. As a result, they expressed a strong preference for cooking apps that offer an offline mode or the ability to access content without relying on an internet connection.

2.4.2 Survey Results

Participants Characteristics

The research interview included a total of 36 participants, with 23 of them identifying as male (63.9%) and 13 as female (36.1%). The distribution of participants indicates a slightly higher representation of males compared to females. Notably, the majority of participants, approximately 80%, were under 25 years old. This suggests that the interview predominantly involved young individuals. Furthermore, it is worth mentioning that the target audience for the research interview was specifically students of Astana IT University. This selection criterion suggests a focus on individuals with a background in information technology, potentially influencing their familiarity and comfort with using digital tools and applications.

Survey Participants' responses

Question: How often do you cook a week?

The survey findings revealed that nearly all of the participants, specifically 34 individuals, possessed cooking skills. However, when examining the frequency of cooking, it was observed that the majority of participants did not engage in daily cooking activities.

According to Figure 2.27, approximately 30.5% of the participants reported cooking twice a week, indicating a preference for less frequent cooking sessions. Additionally, 6 individuals mentioned cooking three times a week, while 5 out of the 36 participants cooked five times a week. It is worth noting that an identical number of participants cooked every day of the week.

Question: How much time does the respondent spend searching for recipes?

Among the respondents, there was a noticeable variation in the time spent searching for suitable meal recipes. Close to half of the participants, specifically 17 individuals, reported spending less than 30 minutes on this task. However, the

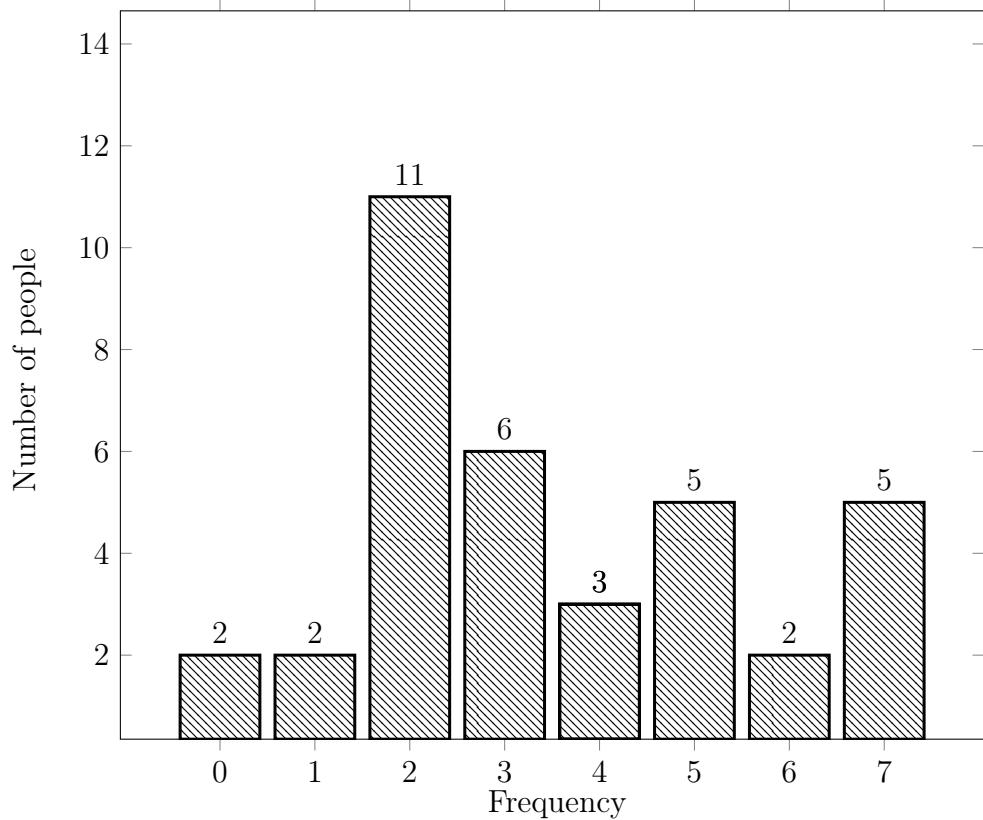


Figure 2.27 – Cooking Frequency per week

remaining half of the respondents indicated it took significantly longer.

Figure 2.28 shows that among the participants who required more time, 10 individuals reported spending around 1 hour searching for suitable recipes. Additionally, 9 respondents stated that they spent more than 1 hour on this task.

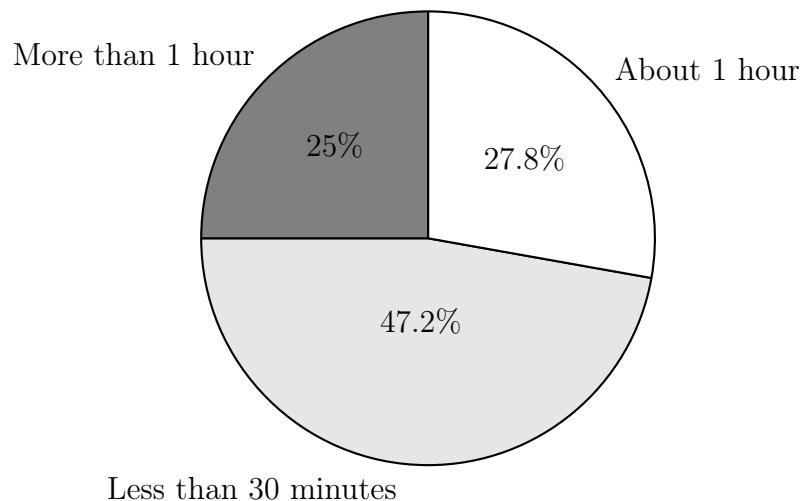


Figure 2.28 – Time spent on searching for recipe

Question: Does the respondent's emotional state change while

searching for the recipe?

The survey results from Figure 2.29 unveiled an intriguing finding, indicating that a significant majority of the participants, specifically 58.3%, reported experiencing changes in their emotional state while searching for the necessary recipe.

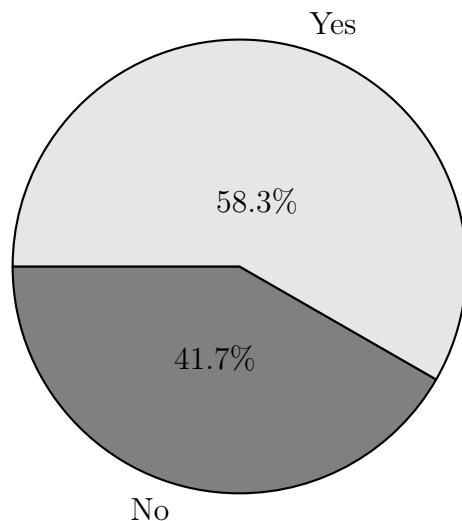


Figure 2.29 – Statistics whether respondents' emotional state changes or not

Question: Assess the respondent's emotional state while searching for the recipe

The survey findings reveal an interesting aspect of participants' emotional experiences during the cooking process. Out of the 36 respondents, it was observed that 9 individuals, constituting approximately 25% of the sample, reported feeling relatively calm throughout the cooking process. These respondents appeared to maintain a sense of composure and stability, demonstrating minimal emotional fluctuations while engaging in culinary activities.

On the other hand, a notable subset of respondents, comprising 6 individuals or approximately 16.7% of the sample, reported experiencing significant emotional swings when attempting to find suitable recipes. These participants described noticeable shifts in their mood, indicating that the recipe search phase had a more pronounced impact on their emotional state. More details are present in Figure 2.30.

Question: Does the respondent use any sources for cooking?

Figure 2.31 demonstrates that a significant majority of the participants, specifically 77.8%, reported utilizing recipe sources when engaging in cooking activities. This finding underscores the widespread practice of seeking external guidance and inspiration to aid in the preparation of meals.

Question: What sources does the respondent use for cooking

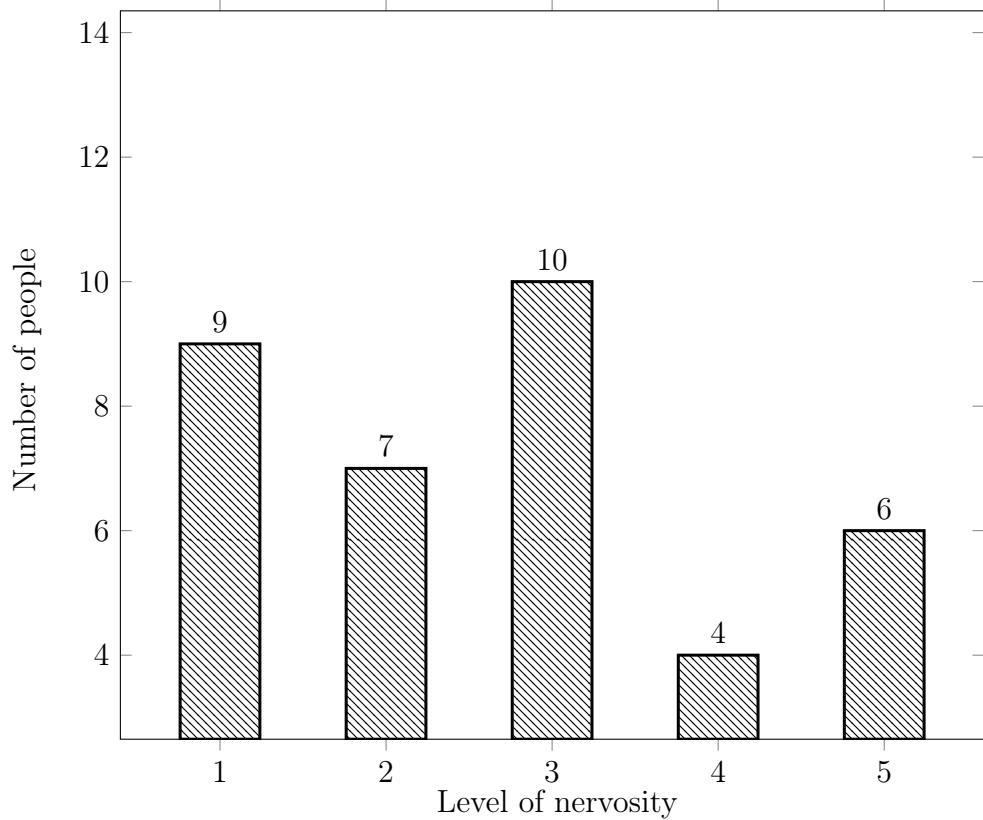


Figure 2.30 – Levels of nervousness while searching for the recipe

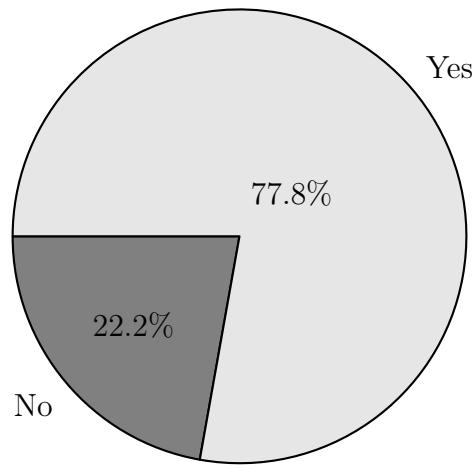


Figure 2.31 – Statistics whether respondents use recipe sources or not

inspiration?

This question allowed respondents to choose more than 1 option and write their own alternative. The main answer options are Cooking apps, websites, books, Instagram, TikTok, YouTube, and Relatives/Friends.

According to Figure 2.32, among the various options available, it was observed that the majority of respondents expressed a preference for YouTube, with 25 individuals (nearly 69.4% of the sample) indicating it as their go-to source for recipes. Another popular choice among the participants was Instagram, with 18

individuals (approximately 50% of the sample) favoring it as a recipe source. Cooking websites were also a popular choice, with 16 participants (about 44.4% of the sample) relying on them for recipe inspiration.

In contrast, cooking apps garnered less popularity among the respondents, with only 7 individuals (approximately 19.4% of the sample) preferring them as a recipe source. Cooking books, despite being a traditional and well-established source of recipes, were preferred by only 3 individuals (approximately 8.3% of the sample).

Interestingly, a few participants mentioned relying on memory and intuition as sources of recipe inspiration, with 1 respondent each (constituting a small percentage of the sample).

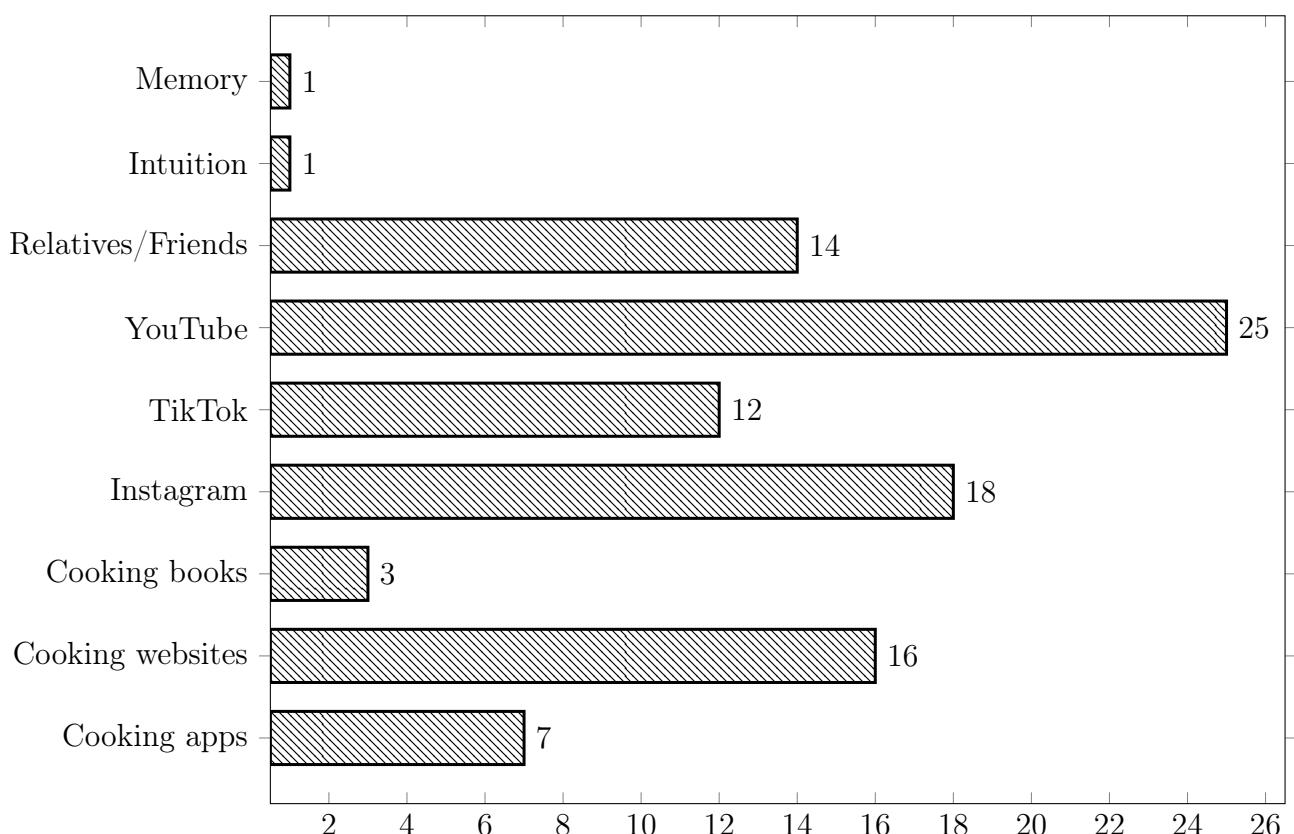


Figure 2.32 – Preferable platforms as a source of recipes

Question: Assess the convenience of social media as a source of recipes

The survey results indicate that the majority of participants, specifically 25 individuals out of 36 (approximately 69.4% of the sample), expressed satisfaction with social media as a source of recipes, where 6 of them showed extreme satisfaction with them.

It is worth noting that 11 participants out of 36 (approximately 30.6% of the sample) expressed dissatisfaction with social media as a source of recipes. The

specific details are presented in Figure 2.33.

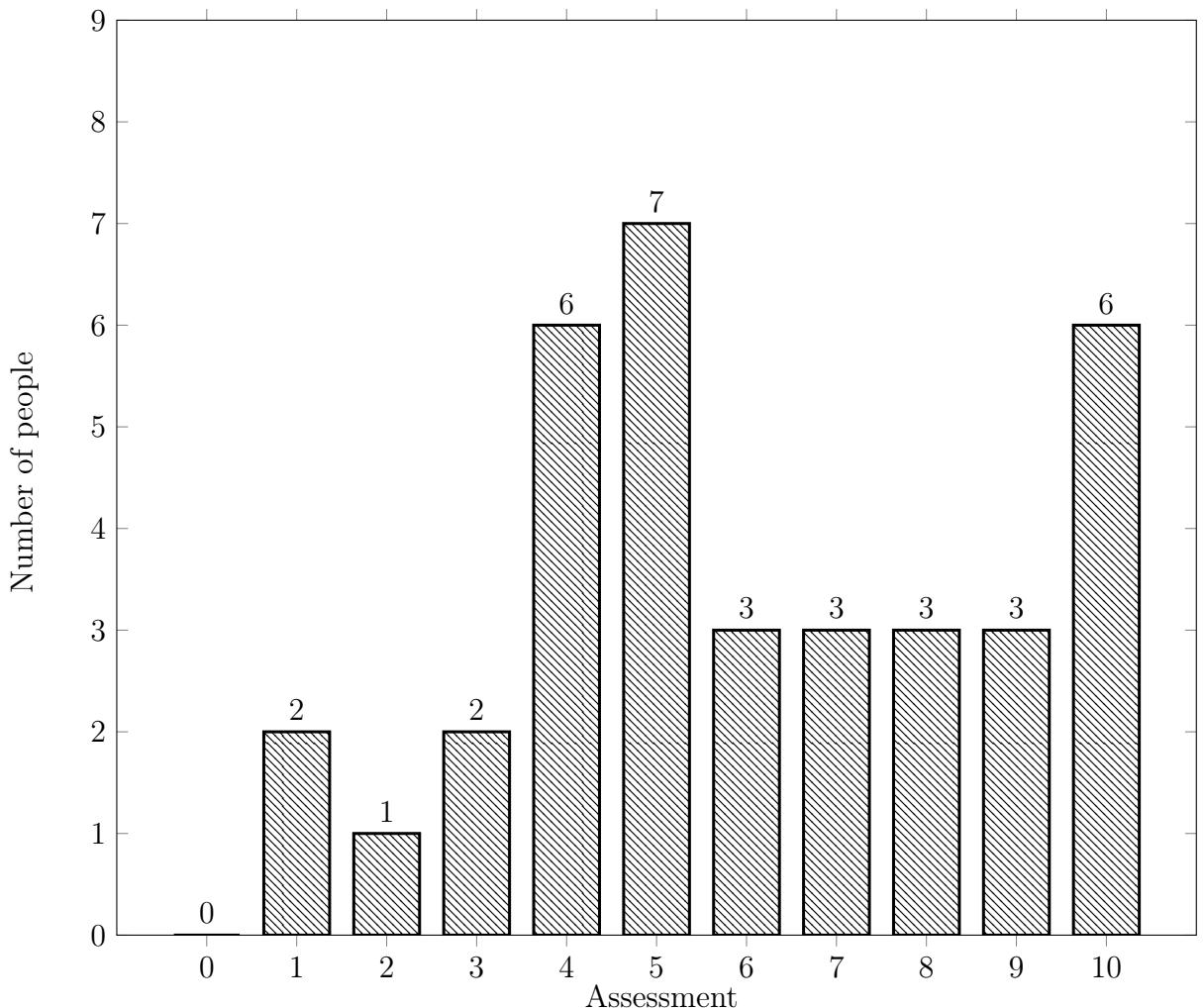


Figure 2.33 – Assessment of social media convenience for searching for recipes

Question: Assess the convenience of cooking websites as a source of recipes

The survey results indicate that the majority of participants, specifically 24 individuals out of 36 (approximately 66.6% of the sample), expressed satisfaction with cooking websites as a source of recipes, where 5 of them showed an extreme satisfaction with them.

It is worth noting that 12 participants out of 36 (approximately 33.3% of the sample) expressed dissatisfaction with cooking websites as a source of recipes, especially 1 person demonstrated absolute displeasure with them. The specific details are presented in Figure 2.34.

Question: Assess the convenience of cooking apps as a source of recipes

The survey results indicate that the majority of participants, specifically 20 individuals out of 36 (approximately 55.5% of the sample), expressed satisfaction

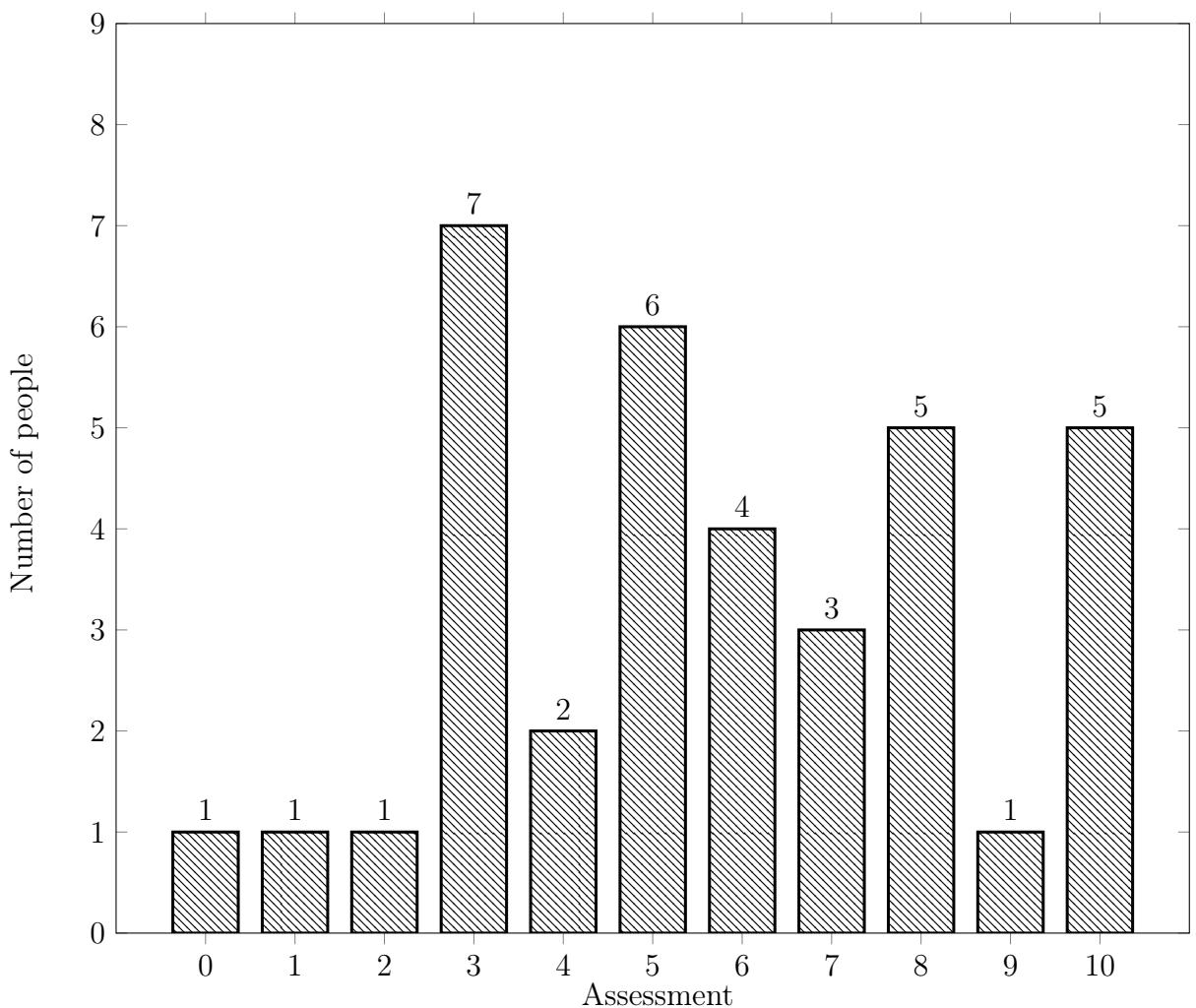


Figure 2.34 – Assessment of cooking websites convenience for searching for recipes

with cooking websites as a source of recipes, where 3 of them showed an extreme satisfaction with them.

It is worth noting that 16 participants out of 36 (approximately 44.4% of the sample) expressed dissatisfaction with cooking websites as a source of recipes, especially 7 people demonstrated absolute displeasure with them. The specific details are presented in Figure 2.35.

Question: What cooking apps does the respondent use?

This question allowed respondents to choose more than 1 option and write their own alternative. The main answer options are Cookpad, Tasty, Yummly, Epicurious, and Kitchen Stories.

According to Figure 2.36, among the various options available, it was observed that most respondents do not use or know about the given cooking app options. The alternative options "none" "do not use or "do not know" were chosen 21 times in general.

However, cooking apps were still picked 34 times. The most popular is the Tasty app (10).

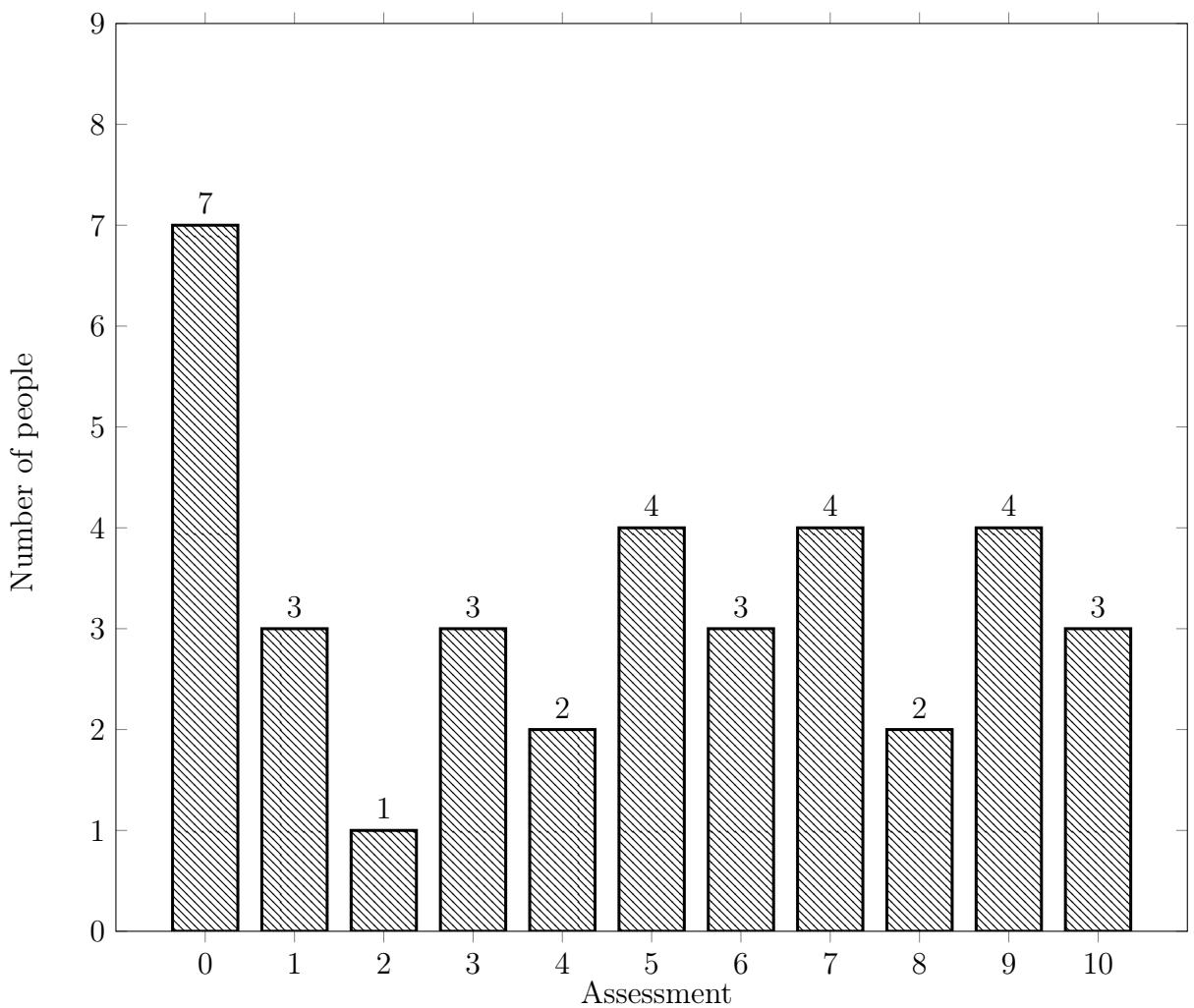


Figure 2.35 – Assessment of cooking websites convenience for searching for recipes

Question: What does the respondent like/dislike about the cooking apps used?

This question allowed respondents to choose more than 1 option from the given list. Even if users did not use cooking apps, they would guess about their features and functionality.

The most favorite features cooking apps offer are an extensive database of recipes (19), no payment for the app (19), and detailed descriptions for every recipe (18). App design and measurement of ingredients were chosen 12 times each.

However, the features they dislike are app subscriptions (16).

Question: What would the respondent like to see in cooking apps?

This question allowed respondents to choose more than 1 option from the given list. This question expects respondents to apply their requirements and preferences.

The survey findings provide valuable insights into the key features and preferences of respondents when it comes to recipe apps. One of the most

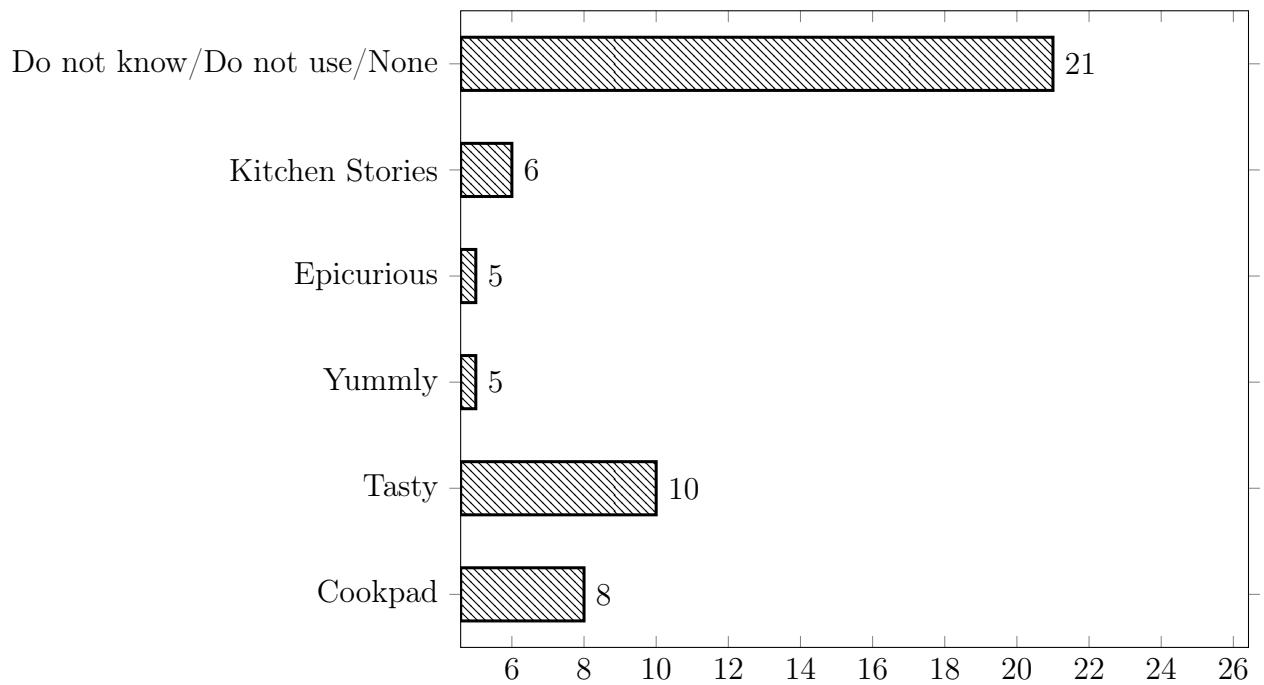


Figure 2.36 – Cooking apps used for searching for the recipe

prominent features that respondents value is the step-by-step feature, which was chosen by 27 participants. Detailed descriptions for every recipe are also highly desired, as indicated by 23 respondents. Participants appreciate recipe apps that provide comprehensive information about ingredients, measurements, cooking techniques, and additional tips. Having a substantial database of good and valuable recipes is another key factor for respondents, with 19 individuals emphasizing its importance. Aesthetics and pleasant app design also play a crucial role in users' preferences, with 19 respondents emphasizing their desire for visually appealing interfaces. Rating and review features were also regarded favorably by 18 participants. Users appreciate the ability to assess the quality and reliability of recipes through ratings and reviews provided by other users.

Lastly, a significant number of respondents (20 individuals) expressed a preference for free recipe apps.

Question: Colors the respondent associate with cooking

Based on the survey results, the respondents showed a clear preference for certain colors when it comes to the design of cooking apps. The favorite colors reported by the participants were yellow, green, orange, and white.

Yellow emerged as the most preferred color, with 20 respondents indicating their fondness for it. Green was also a popular choice, with 17 respondents expressing their preference for it. The color orange garnered the appreciation of 13 respondents. White was chosen by 12 respondents.

On the other hand, the least liked colors for the cooking app palette were blue (5), beige (4), and pink (1).

2.5 Discussion

The decision to focus on female interviewees was based on the traditional societal roles and expectations surrounding cooking and food preparation within the family unit. Women are commonly perceived to be more inclined towards cooking and assume the responsibility of providing meals for the entire family. Thereby, the respondents were selected deliberately.

Moreover, the marital status and occupation of the interview participants cannot be unnoted since due to these characteristics they have cooking habits. Thereby, the women with husbands and children/grandchildren always attempt to cook as much in order to be sure that every family member is full and not feeling bad. However, when a person is single, he/she would not see the necessity of cooking. In contrast, the predominance of male participants in the survey can be attributed to the higher representation of male students at Astana IT University. This university, like many others, may have a higher enrollment of male students in the IT and technology-related fields. Therefore, by including a larger number of male participants in the survey, it becomes more representative of the student population at the university.

Targeting this specific population category is particularly important because university students, especially those living away from home, often face the challenge of starting to cook for themselves. Being away from the comfort of home-cooked meals, they are often unfamiliar with cooking techniques, recipe ideas, and proper nutrition. As a result, they have to rely on searching for suitable recipes and seeking advice to fulfill their dietary needs.

Furthermore, university students, especially those studying in IT-related fields, tend to possess more technological competence and understanding. They are accustomed to analyzing technologies and grasping their concepts more effectively. This technical proficiency makes them well-equipped to evaluate and provide valuable insights into the features, functionality, and user experience of a cooking app.

By specifically targeting this social group, the survey results become more accurate and reflective of the challenges and preferences faced by university students, particularly those who are starting their culinary journey. The insights gained from this group enable a deeper understanding of their needs, preferences, and pain points regarding cooking and recipe searching. Consequently, the design and development of a cooking app can be tailored to better meet the specific requirements of this target audience, ultimately leading to a more effective and user-friendly solution.

It is also crucial to mention the variation in age among the interviewees that naturally brought forth a wealth of diverse experiences and levels of expertise in cooking. The youngest participant, aged 25, has had more recent

exposure to modern cooking techniques, culinary trends, and the influence of technology in the kitchen. The younger generation's responses and insights could reflect a contemporary approach to meal planning, recipe experimentation, and incorporating diverse cultural influences.

On the other end of the age spectrum, the 61-year-old participant possessed a wealth of traditional knowledge and firsthand experience in cooking that comes from years of preparing meals for the family. Responses of the older generation might have provided valuable insights into long-standing family recipes, cultural traditions, and the challenges and joys associated with fulfilling the role of primary meal provider over several decades.

Regarding recipe sources, the survey results indicated that social media platforms, specifically YouTube and Instagram, were the preferred sources for recipe searching among the participants. This preference can be attributed to the visually appealing content and accessibility of recipes shared on these platforms. However, it is essential to note that some participants expressed dissatisfaction with social media as a recipe source, the inconvenience of manually searching for nutrition facts and recipes inside many posts of users, and even in the Saved tab. Furthermore, cooking websites are also not a good choice for searching for recipes since the majority of publications have random structures with unappetizing pictures. These findings present an opportunity for a dedicated cooking app to address these specific pain points and provide a more streamlined and user-friendly recipe-searching experience.

The preferences of the participants regarding app features and design elements were identified through the survey. The majority expressed an appreciation for a step-by-step feature, detailed recipe descriptions, a comprehensive recipe database, and a visually pleasing app design. The importance of user reviews and ratings for each recipe was also emphasized. These findings underscore the significance of incorporating these features into the cooking app to enhance user engagement, satisfaction, and overall user experience.

Furthermore, the color preferences of the participants, with yellow, green, orange, and white being the most favored colors, provide valuable insights into the app's visual design and branding. These colors are associated with coziness, organic food, and cleanliness, aligning with the desired associations of home cooking and healthy eating. By incorporating these color preferences into the app's visual elements, it can create a visually appealing and inviting user interface that resonates with the target audience.

It is important to acknowledge the limitations of the study. The sample size was limited to the participants from Astana IT University, which may not be fully representative of the broader population. Additionally, the survey focused on preferences and challenges related to cooking and recipe searching, with limited

exploration of other factors such as dietary restrictions or cultural influences. Future research could consider expanding the sample size and exploring additional factors to gain a more comprehensive understanding of the target audience's needs and preferences.

CONCLUSION

In conclusion, this paper has presented the development and design of a cooking app aimed at providing a comprehensive and user-friendly experience for individuals who are new to cooking or seeking inspiration in the kitchen. The project was undertaken based on extensive research, including interviews and surveys, to ensure that the app's features and design align with the needs and preferences of the target audience.

The research findings revealed valuable insights into the cooking habits, preferences, and challenges faced by individuals who are cooking enthusiasts and students at Astana IT University. It was observed that many students often find themselves needing to cook for the first time when they move away from home, leading to a demand for easily accessible and reliable recipe sources. Also, people who have a good amount of cooking experience knowing every recipe among ordinary food desire to find something new that can surprise them and their family members. Additionally, the participants preferred user-friendly and time-efficient apps that provide step-by-step guidance, a large recipe database, and offline access.

Based on these findings, the app was developed with a focus on key features such as a step-by-step recipe guide, detailed recipe descriptions, a vast recipe database, offline functionality, and a visually appealing user interface and recipe aesthetics. The app incorporates must combine all necessary features all together to offer a valuable kitchen tools to the audience solving their daily struggles. It should help them to eat tasty and healthy to enable people to forget about eating out or food delivery by easy and interesting cooking process.

To convince people that the app is secure and there is no chance of data leak, high-level modern technologies were used, like Furthermore, Firebase Storage and Authentication, and Swift.

The implementation of app's user interface was carefully executed, considering the participants' color preferences and utilizing a visually appealing color palette with warm and organic tones. The UI components, including the status bar, tab bar, search bar, recipe cards, category cards, and various input fields and buttons, were designed to enhance usability and provide a seamless user experience. Also, these components match to modern design concepts making the app up-to-date.

The project successfully addressed the research objectives and delivered a cooking app that meets the needs and preferences of the target audience. By incorporating user feedback and considering the challenges faced by ordinary culinary lovers and students in their cooking journey, the app aims to simplify the process of finding and preparing recipes, ultimately empowering users to explore their culinary skills and create delicious meals.

In conclusion, this project serves as a valuable contribution to the field of

Kazakhstani and CIS cooking app development, particularly in the context of supporting students and individuals who are new to cooking and have a great experience in this field. The comprehensive research, thoughtful design, and meticulous implementation have resulted in a user-friendly and feature-rich app that is poised to enhance users' cooking experiences and inspire their culinary adventures.

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Appendix A Code of ContentView

```
import SwiftUI
import Firebase

struct ContentView: View {

    @State private var tabSelection = 1
    var userIsLoggedIn = false

    var body: some View {

        if userIsLoggedIn {
            TabView(selection: $tabSelection) {
                HomeView().tag(1)
                CategoriesView(categories: Category.allCases,
                               searchQuery: "").tag(2)
                AddRecipeView().tag(3)
                SavedView(categories: Category.allCases,
                           searchQuery: "").tag(4)
                ProfileView(user: User.users[0],
                            recipes: Recipe.all).tag(5)
            }
            .overlay(alignment: .bottom) {
                TabBar(tabSelection: $tabSelection)
            }
        } else {
            OnboardingView()
        }
    }
}

struct ContentView_Previews: PreviewProvider {
    static var previews: some View {
        ContentView(userIsLoggedIn: false)
            .previewLayout(.device)
            .previewDevice("iPhone 14 Pro")
            .environmentObject(RecipeViewModel())
    }
}
```


Appendix B Questions of data collection

There are questions used while the interview and survey for data collection.

Questions:

- 1 Respondent's gender.
- 2 Respondent's age.
- 3 How often does the respondent cook?
- 4 How much time does the respondent spend searching for recipes?
- 5 Does the respondent's emotional state change while searching for the recipe?
- 6 Assess the respondent's emotional state while searching for the recipe.
- 7 Does the respondent use any sources for cooking?
- 8 What sources does the respondent use for cooking inspiration?
- 9 Assess the convenience of social media as a source of recipes.
- 10 Assess the convenience of cooking websites as a source of recipes.
- 11 Assess the convenience of cooking apps as a source of recipes.
- 12 What cooking apps does the respondent use?
- 13 What does the respondent like about the cooking apps used?
- 14 What does the respondent dislike about the cooking apps used?
- 15 What would the respondent like to see in cooking apps?
- 16 Colors the respondent associate with cooking.