

**UPLB TAKAM: A SMART MOBILE COOKBOOK AND INGREDIENT
MANAGEMENT MOBILE APPLICATION**

A Special Problem Presented to the Faculty
Of the Institute of Computer Science
University of the Philippines
Los Baños

In Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science

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ABSTRACT

The UPLB TAKAM mobile application represents a timely and essential solution post pandemic, addressing the challenges that UPLB students face in meal preparation, budgeting, and nutrition. Through its innovative features such as intelligent ingredient management, personalized meal plans, and budget-friendly recipes, UPLB TAKAM aims to alleviate the burdens of time constraints, financial limitations, and unhealthy eating habits. By providing convenient access to budget-friendly, nutritious meals, UPLB TAKAM helps students make healthier food choices, develop cooking skills, and improve their well-being, supporting long-term health in a changing educational and global environment.

INTRODUCTION

A. Background of the Study

Food is one of the most fundamental human necessities. It supplies the necessary energy and nutrients for growth and development, gaining strength, and working productively. While you can eat many things to survive, cooking makes food taste better. Simply put, cooking enables us to prepare and eat safe and nutritious food, giving us the fuel and building blocks we need for growth and repair. Cooking also makes it possible for one to exhibit self-expression and creativity by preparing one's own unique dishes and playing around with various flavors and ingredients to create recipes. A recipe is a set of instructions telling you how to prepare and cook food, including a list of what food is needed [1]. Name, procedure, tools and ingredients, time, and serving size are only a few of the components that make up a cooking recipe.

The coronavirus disease (COVID-19) brought turmoil and uncertainty around the world. As a result, the COVID-19 epidemic influenced the buying habits of people worldwide. As the Philippine government imposed lockdowns to stop the spread of the virus, it had a significant impact on daily life, frequently having negative effects on mental health [2]. Clearly, food preferences have also evolved. People have begun focusing on food health concerns and have become more particular about the food quality they consume daily [3] [4]. In light of these issues, people must maintain their immunity to the disease. Thus, customers were instructed to adhere to health protocols to prevent the spread of COVID-19. The World Health Organization (WHO) also encouraged people to have a healthy lifestyle by consuming healthier foods and minimizing or

eliminating alcohol [5]. According to the study conducted by Tariga, Nolasco, and Barayuga (2021) [6], the results depicted a growing pattern of home-based cooking both before and during the pandemic. Based on the results, respondents who cook every day have a 5% rise before (93%) and during the pandemic (98%), while those who do not cook frequently decrease. This is evident since people were restricted to stay home to prevent local transmission of the virus, they prefer to cook at home daily. This also indicates that Filipino consumers altered their food consumption patterns before and during the pandemic, with the likelihood of further change after the COVID-19 outbreak, encouraging Filipinos to choose healthier cuisine and cook at home.

In general, people enjoy cooking but lack inspiration for what to cook. The question "What should I eat/cook today?" continues to arise. In addition to their unfamiliarity with a variety of dishes, they wish to learn specific recipes that suit their preferences. Moreover, although most individuals can cook at home, not everyone can easily memorize the recipes they want. For someone who lacks a passion for cooking, having a limited supply of ingredients also becomes one of the factors that contribute to a limited variety of cooking creations. A college student who goes to classes every day, especially if they live alone in a dorm, wants to cook food for themselves as quickly and easily as possible when they are busy. But having the same easy-to-cook food over and over can be tiring and get old for them, so it would be better to recommend a variety of food they can cook "easily" [7]. Certainly, this issue can be quickly resolved by looking online like cooking apps or websites for more food recipes. Even though these apps take into account their users' needs and interests, they don't take into account their users'

constraints, such as the availability of ingredients, the user's skill level, their budget, or dietary restrictions.

As time has progressed, technology has evolved into a tool that enables communication between people. The use of technology is fundamental to many of humanity's daily activities, such as cooking and preparation of food. In this current age of technology, new things have been made to make it easier for people to find and collect the recipes they want. With the integration of food and technology, the development of a wide range of food recipe applications can be possible. Concurrently, the need for food recipe applications has dramatically increased in response to the sudden increase of people who prefer to stay and cook meals in their homes due to the ongoing pandemic, as well as the tendency of people to make healthier food choices during the pandemic [6].

B. Statement of the Problem

The pandemic hindered many individuals in all aspects — majority of stores were closed and people were stuck in a lockdown for more than a year. Since the price markup of meals and using food delivery apps became reasonably impractical, majority opted for own meal preparations inside their homes. However, meal preparation has been viewed as a problem since it is an extra responsibility on top of the other responsibilities a person holds. Moreover, meal repetition of unhealthy foods has been common to help suffice the problem of having more responsibilities for simple meal preparation.

C. Significance of the Study

The development of the new application, UPLB TAKAM, aims to lessen the burden of meal preparation by making it easier to prepare and think of meals without exerting a lot of effort and consuming a lot of time by also taking in mind the budget-friendliness and healthiness of meals. Good nutrition is vital for college students' overall well-being, academic performance, and mental health. However, the limited availability of nutritious food options and the prevalence of unhealthy eating habits can pose significant challenges. UPLB TAKAM places emphasis on healthiness, offering a selection of nutritious recipes that cater to students' dietary needs. By promoting healthier food choices, the application encourages students to adopt sustainable eating habits that can positively impact their physical and mental health.

D. Objectives of the Study

The objective of this study is to provide a mobile application to UPLB students that would be helpful for their meal preparation and lessen the burden of treating meal preparation as a responsibility. Specifically, it intends:

1. To provide a budget-friendly meal recipe cookbook application;
2. To assist students in creating a balanced meal plan encompassing a variety of food from the three basic food groups (go, grow, and glow), with minimal to no meal repetition;
3. To provide inventory management features for ingredients; and
4. To provide grocery list generation features.

E. Scope and Limitations of the Study

The recipes included in this mobile application will be limited to 28 Filipino budget-friendly meals. This is to ensure that the students have the capability to purchase the raw materials needed to prepare meals. Additionally, this is done to guarantee that the ingredients needed in the meals are commercially available in supermarkets, grocery stores, and marketplaces. One of the reasons for this restriction is the data and storage constraints of Firebase's free Spark Plan, which limits the data that can be stored and accessed. The sampling population for this research will be limited to UPLB constituents with kitchen aid and equipment to ensure that they have the resources and capacity to prepare meals.

REVIEW OF RELATED LITERATURE

A. Effects of the Pandemic in the Philippines

The COVID-19 lockdowns implemented from 2020 to early 2022 caused widespread unemployment, with the bulk of jobs in the services sector, which was largely unable to operate during that period. According to the Philippine Statistics Authority (PSA), the annual unemployment rate in 2020 was 10.3% or 4.5 million unemployed Filipinos. Since April 2005, this has been the highest annual unemployment rate ever recorded. As a result, the Philippine economy entered a deep recession with households forced to seek aid from the national government, dip into savings, secure loans, or all of the above to make ends meet [8].

On top of the unemployment crisis, the majority have been experiencing mental health problems due to different stressors that add to their worries about their health, safety, and well-being. The problems encountered by Filipinos are further aggravated by incidents of natural disasters, armed conflicts, and animal disease outbreaks alongside the pandemic crisis [9].

The Philippines' national debt increased by 26.7% to P9.7 trillion in 2020. This had risen to P10.3 trillion at the end of January 2021 after the government took out a new bridge loan from the BSP to cover financial obligations. Revenue also fell by 9% in 2020 due to rising expenses resulting in a P1.37 trillion budget deficit in 2020 due to higher expenses and decreased revenue [9].

B. Food Consumption Habits

Based on the results of the study conducted by Janssen, et al. (2021) [11], people in Denmark, Germany, and Slovenia reduced their consumption of fresh food when the epidemic began, with the exception of households with children. This shift is associated with reduced shopping frequency across all countries during the pandemic and with elevated COVID-19 risk perceptions in Denmark and Germany. This study's findings imply that individuals' levels of COVID-19-related worry, income loss, home composition, and gender all played a role in the shifts in eating behavior that occurred during the first wave of the pandemic [11]. On the other hand, the study conducted by Di Renzo, et al. [12] provided information on the COVID-19 lockdown diet, lifestyle, and eating habits of the Italian population. Some 48% of the population has seen they've put on weight, while 38% of those polled have noticed they've become slightly more active, especially in terms of bodyweight exercise.

According to the study conducted by Tariga, Nolasco, and Barayuga (2021) [6], the results depicted a growing pattern of home-based cooking both before and during the pandemic in the Philippines. Based on the results, respondents who cook every day have a 5% rise before (93%) and during the pandemic (98%), while those who do not cook frequently decrease. This is evident since people were restricted to stay home to prevent local transmission of the virus, they prefer to cook at home daily. This also indicates that Filipino consumers altered their food consumption patterns before and during the pandemic, with the likelihood of further change after the COVID-19 outbreak, encouraging Filipinos to choose healthier cuisine and cook at home.

C. Inflation in the Philippines

According to the PSA, inflation jumped to its highest level in four years in September, reaching 6.9%. This increase was mostly driven by increasing food prices [13]. It was a significant improvement from the 4.1% that was recorded in 2021. It increased inflation during the year to date to 5.1%, which is getting close to the top end of the range that the government anticipates for 2022, which is 4.5 to 5.5%.

The volatility of oil prices has a directly proportional relationship with inflation. This leads to rising production costs that will burden consumers, increasing the prices of goods and services. As the inflation rate in 2022 continues to rise, the highest increases in the indices of transport, food and non-alcoholic beverages, housing, water, electricity, gas, and other fuels have been recorded highest [14].

Focusing on food inflation, it was stated that the national average inflation rate for food climbed from 6.5 percent in August to 7.7 percent in September. This increase was highlighted in the study. Sugar, confectionery, and desserts account for 30.2% of the total increase in the cost of food, while corn accounts for 26.2%, and oils and fats account for 10.4%.

The costs of meat and fish products have been elevated for some time now and are one factor that goes into determining the overall level of food inflation. Even though the price hike seems minimal, regular customers still cannot afford their products [15].

Moreover, onions, a staple in Filipino cuisine, its price increased up to 600 pesos per kilogram. Making it 2-3 times more expensive than chicken, pork, or beef, and even greater than the minimum wage for a day's work here in the Philippines [16].

D. Rise of E-Commerce

Amid the slowing economic activity, COVID-19 has led to a surge in e-commerce and accelerated digital transformation. As lockdowns became the new normal, businesses and consumers increasingly “went digital”, providing and purchasing more goods and services online, raising e-commerce’s share of global retail trade from 14% in 2019 to about 17% in 2020 [17].

As a result of unemployment and rising expenses, a lot of people resorted to starting small businesses online—Shopee, Lazada, Tiktok, and Facebook Marketplace are some of the most popular avenues for these businesses. This was and is still a popular practice in the Philippines since it is not only more convenient to both buyers and sellers due to door-to-door delivery and a bigger variety of goods, but also because products are priced lesser online compared to the commercialized stalls in malls.

However, when it comes to food deliveries, products are priced higher than usual compared to diners who order the same meal at the restaurant, having 7% up to 91% markup of meals in food delivery applications like FoodPanda and GrabFood excluding the delivery fees [18]. Even though food delivery presents several advantages such as convenience, a wide variety of options, and efficiency, not all people view this service as practical to patronize given the circumstances of inflation [19].

E. Technology in Food Management and Cooking Applications

The rise of mobile applications and technology in food management and cooking has been evident in recent years. Various mobile applications, websites, and software have been developed to assist individuals in meal planning, recipe discovery, and

ingredient management. These applications aim to provide convenient, budget-friendly, and healthy cooking solutions for users.

For example, applications like Yummly, Allrecipes, and Tasty offer a vast collection of recipes, catering to diverse culinary preferences and dietary requirements [20]. They provide step-by-step cooking instructions, ingredient lists, and nutrition information, empowering users to experiment with different dishes. Websites like Supercook.com have also gained popularity, allowing users to search for recipes based on the ingredients they have on hand [21]. Supercook.com uses advanced algorithms to generate recipe suggestions from a database of millions of recipes, enabling users to make the most of their available ingredients and minimize food waste.

Moreover, meal planning applications like Mealime and MealBoard enable users to create weekly meal plans, generate grocery lists, and manage their inventory efficiently [22]. By integrating technology with food management, these applications streamline the meal preparation process, helping users save time and make smarter shopping decisions.

METHODOLOGY

A. Development Tools

The information system will be developed on a machine with the following specifications:

- Operating System: Windows 11 64-bit
- Processor: 11th Gen Intel® Core™ i5-11400H with clock rate 2.70GHz
- Memory: 16GB RAM L1 cache 480KB

The following software development tools and technology stack will be used for the development of the system.

1. Environment

- Visual Studio

A feature-rich source code editor which served as the main environment for developing the mobile application.

2. Technologies

- React Native

An open-source portable UI software framework for building cross-platform mobile applications using JavaScript and React.js.

- Firebase

A database management program that manages the database of the mobile application.

- Cloud Firestore

A cloud-hosted NoSQL database that supports real-time data synchronization and storage for mobile and web applications.

- Expo Go

A development platform that provides tools and services for building, deploying, and maintaining cross-platform React applications for iOS and Android.

B. Types of Users

The use case diagram is shown in Fig. 1. There is only one type of user that can use the application:

1. User

- The user enters the following information to sign up in the application:
 - a. First Name
 - b. Last Name
 - c. Email
 - d. Password
- The user is required to sign in and enter the following information to use the application:
 - a. Email
 - b. Password
- The user needs to fill up the inventory with ingredients to effectively use the filter features of the application.

- The user can view the ingredients added and may edit the details of the ingredients:
 - a. Expiration Date
 - b. Stock
- The user can view the recipes available in the application and choose the recipe to cook.
- The user can filter the recipes shown.
- The user can view the meal plan made by the application.
- The user can view a grocery list generated from ingredients that are low in stock or nearing their expiration date.
- The user can edit the grocery list, he/she can add or delete items in the list.
- The user can edit the meal history tracker, he/she can input the meals consumed for the day.
- The user can view the notifications.

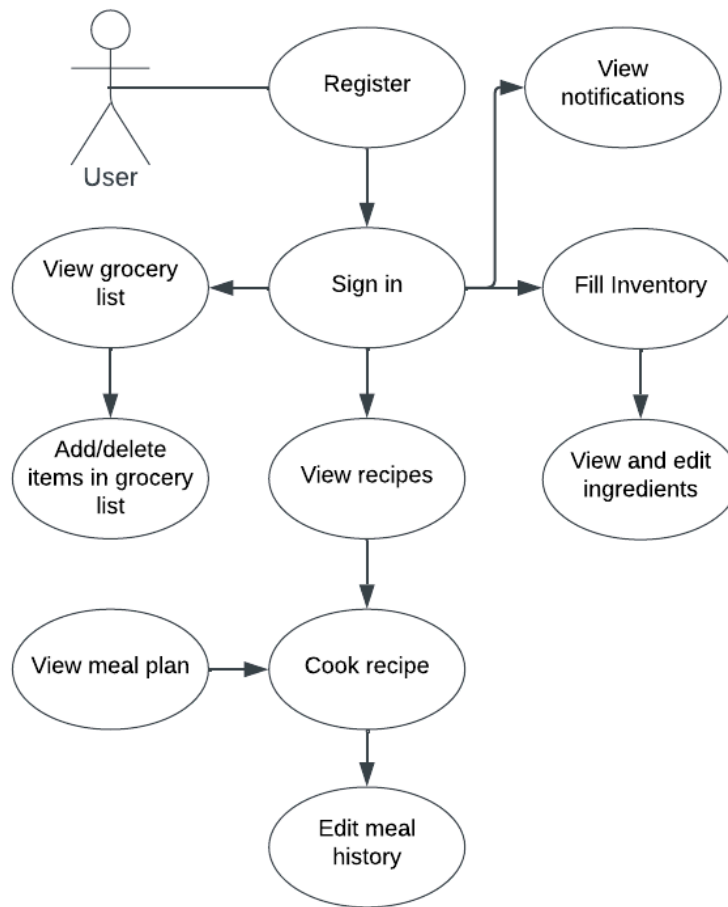


Fig. 1. Use Case Diagram for UPLB TAKAM: A Smart Mobile Cookbook and Ingredient Management Mobile Application

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