

Dishcover Indonesia

Android Cooking Game on Indonesian Cuisine

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Abstract — The video game industry can be said to be one of the more modern undying industries that are ever growing and evolving. In Indonesia, there are several game development companies, however, there is currently no game that utilizes Indonesian cuisine as the main theme. It is also noted that there have been no recent cooking games that are unique nor a sequel. Currently, there is a gap in which consumers are not playing cooking games although they enjoy them. As a result, the author attempts to develop a game that can reach users' expectations for a modern Android cooking game. Users were tested in two phases. Before the development, users were asked to rate their expectations of a cooking game and the current competition. After the development of the game, users were given the beta to test and rate their evaluation of the application. Based on the results of the two surveys, the game has achieved the results desired in the beginning of the project development.

Keywords — *Android Mobile Game, Mobile Application, Unity, Android, Game Development, Game Design*

I. INTRODUCTION

The world today is a world of technology. From the start of the Digital Revolution decades ago, technological advancements have been happening at an exponential rate. Technology unheard of a decade ago, are now breaking into the market as if it was common bread. These developments are no longer considered a luxury but a need for the people. However, at the same time, these automated machines and devices are often scrutinized by members of the older generation. These people do not have much trust in such technological power and are instead scared of it. Despite this situation, there is still one technological field that has grasped both the older generation and the newer generation of the masses. This field, which is Video Games, is one of the most enduring fields that have existed from the earlier years of the computer and likely indefinitely into the future. This can be seen by the current ratio of gamers in the United States of America in which 45% of the player base is older than 36 years, with the average age being 35 [1].

The main reason of the continuity of the existence of video games is due to its abstract nature that provides an experience unlike any other media. Games do not provide any means of making life easier or provide any necessities. In a game's scenario, if players can enjoy the game, they will play it. In simpler terms, games only have one abstract requirement for the players while service apps have several

requirements that change gradually over time. Comparing to other media, games are the only ones where the audience can fail. This provides a dynamic experience, with the possibility of losing, to those who play games for entertainment and create a scenario that is different on each play through.

According to the previous study [1], 42% of gamers are female. In other words, 2 out of 5 video game players are females. With the result of this study, it is clearly understood that games are not just for males and the development of games should be able to cater to both sexes to perform well. As a result, the author attempted to develop a game that will interest both males and females. According to the survey done by the author, 71% of the gaming respondents have played cooking games in their life, in which 98% of those gave positive reviews [2]. However, when asked on what kinds of games the respondents are currently playing, only 14 out of 158 respondents answered cooking. In conclusion, the demand for cooking games is available, but the supply is not. Another key aspect of the survey is that the benchmark for cooking games, which is Cooking Mama has a 27.7% rating of very positive. In other words, there is a huge room for improvement for cooking games.

Another aspect of games that the author researched in is the current popularity in mobile games. Although the growth is slowing down, more than 79% of smartphone owners play mobile games. According to an American study [3], there are 155.3 million American mobile game players in 2016. 48% of this market consists of those that pay for mobile games. As a result, the revenue for mobile game claims 42% of the revenue market. In 2017, an estimated amount of \$46.1 billion revenue was generated by mobile games while the console and PC games generated \$33.5 billion and \$29.4 billion respectively [4]. This is also due to the increasing occurrence of 'gacha' games or more commonly known as loot boxes. Games such as Clash Royale [5] and Fate: Grand Order [6] have continually dominated the mobile market and stayed at the top 100 rankings for games in several countries. Player activity also increases a lot when events with new loot boxes are released. Both games have a focus on card or item collection as a basis. Such mechanics are considered to be the current meta of mobile game development compared to energy systems of games of the previous years.

In conclusion, the author attempts to create a long-term game project that can hopefully attract both genders and of all age groups. Another aspect taken note of is the current demand and supply of such a game. As a result of the research, the author has decided in developing a cooking

game for iOS and Android devices. Cooking games have a high playing ratio by both genders while at the same time not having any current supply. In contrary to Cooking Mama, the game will attempt to include foods local to Indonesia. This would provide knowledge and an entertaining educational experience to the players. Furthermore, the culture of Indonesia will be promoted via its food cuisine to all players around the world. Alongside these features, following the current trend of mobile games, the author has also decided on adding loot boxes to the cooking game, to make the game more dynamic and entertaining.

II. THEORETICAL FOUNDATION

A. Game

A game is defined differently by people and is often up for debate. In most cases, we generally agree that a game is a form of play or sport that involves skill, luck or strength in a competition of sorts. Other explanations and definitions declare that games are activities with rules, competition, chances and a goal [7]. However, modern games continue to push the previous borders and limits of such definitions. This is especially true for digital games with examples such as Goat Simulator which does not have any competition or proper goals [8]. Players take the role of a goat and wreck stuff randomly with no grandeur objective nor winning conditions. The rules of the game are only the rules of game engine physics, walking speed and level walls. There is no competition as the game provides no winning or losing condition. However, this software is indeed considered a game at least by the public. Therefore, there is a conflict in the definition of games, and there is no right or wrong in game development. In conclusion, games can be a form of activity which requires the player's interaction or participation to continue.

B. Mobile Games

The origin of mobile games can be traced to the early 1990s, however, the popularity of it only started in 1997. This was due to the release of "Snake" on handheld Nokia phones [9]. With continuous development and user demands, a platform for getting more games was created. The Wireless Application Protocol (WAP) can be said to be the father of the App Store or Play Store. It is one of the key dominant features on a smartphone and is the driving force of the popularity of mobile games. With WAP, developers were able to create games and provide them to players globally from the net.

In the current day and age, smartphones are not shipped with games. With the speed of 4G and current internet service providers, users are able to download any mobile games they want over the internet in a matter of minutes, sometimes seconds. The App Store and the Play Store provides both the users and the developers a platform to share and play games safely without the risk of scam or other malicious intents.

As mentioned previously, the mobile game market dominates 42% of the industry in 2017 [4]. The same researchers concluded that the mobile game market would

cover 50% of the industry by 2020. In simpler terms, the mobile game market is still in a growing stage although it is already slowing down. However, since the world's population will continue to increase, the demand for mobile games and applications will always be available. The supply has also increased by more than double in the last three years. In the start of 2015, around 316,000 games were out on the mobile market. By the end of 2017, almost 800,000 mobile games are available [10]. However, even with such astounding numbers, the demands of players are still not fulfilled due to the nature of humans and games. Following the rule of customers not knowing what they want, the demand for games will always be available regardless of time. For instance, if gamers were asked if they would like to play a one button game with unrealistic physics and questionable difficulty, the likely answer would be no. Therefore, if Dong Nguyen (the creator of Flappy Birds) did his market research, highly like he would have created a clone of another existing game. Players did not even know they had a demand for such a game.



Fig. 1. Global Games Market [4]

C. Types of Gamers

There are several methods to categorize the players when designing a game. For this project, Bartle's Taxonomy will be used. According to Richard Bartle, players can be divided into four categories - achievers, explorers, killers, and socializers

It is also noted that players will generally overlap several categories while having one dominant trait.

- **Achievers:** Those categorized in achievers generally prioritize achievements, loot rewards and scores. They will attempt to follow all the given rules and win the game.
- **Killers:** Those categorized in killers tend to prefer chaos and disorder. They prioritize affecting other player's gameplays and the world's either by player killing, NPC killing and other forms of deceit.
- **Explorers:** Players categorized under explorers are keener on discovering every inch of the game. They will attempt to unlock all the secrets and missions of a game. These players tend to collect as much information as possible to create a winning strategy.
- **Socializers:** Players categorized as socializers put higher priority into making friends and relationships in

the game. These players are generally keen to share strategies, stories and co-operating with one another.

D. Loot Box Trend

A loot box is a redeemable chest or crate of item(s) that provides random in-game items upon opening. Similar to the Japanese version, gacha, loot boxes can be considered a form of lotteries. A loot box is similar to a booster pack for card games, in which the players would not be aware of its contents. The contents of loot boxes can range from heroes, skins, resources and equipment. These loot boxes often end up as a monetization method to help pay development costs.

Loot boxes in video games has become quite a controversial growing trend, especially in 2017, heavily caused by the release of “Star Wars Battlefront II” [12]. But in truth, loot boxes can be traced further back to 2010 on “Team Fortress 2”. Many other major games including “DotA 2” have also been using the concept of loot boxes as their monetization scheme for years. However, due to the decision of EA on Star Wars, loot boxes have been receiving a negative reputation on its legality and player enjoyment. Currently loot boxes have been legally marked as gambling in several countries, mainly China and Japan. However, most countries have not considered loot boxes to fit the definition of gambling.

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E. Game Development Life Cycle

Game development life cycle is similar to software development life cycle but for games. Unlike software, the life cycle for games is vaguer and there is no definitive life cycle. However, there is a general format for game development in which it begins in the prototype and discussion stage, followed by production, testing and release [13]. Depending on the studio, games may be built in iterations with each testing resulting in new reviews and feedbacks.

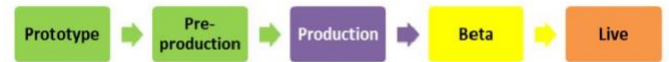


Fig. 2. Example of Game Development Life Cycle [13]

III. PROBLEM ANALYSIS

A. Existing Solution Research

The cooking game genre has existed since decades ago. Although the demand for cooking games cannot be said to be very high, there is indeed always a demand. This can be seen from the popularity of such games listed below.

- Cooking Mama
- Chef Wars
- Cook, Serve, Delicious
- Order Up!

B. Survey Market Research

A survey was done by the author in regard to games, mobile games and cooking games [2]. A total of 192 participants, originating from several countries, including but not limited to, Indonesia, the United States of America, and Australia answered the survey. The survey was carried out online via Google Forms and shared online through social medias and forums. The survey attempts to analyze the user’s views on games, its importance and the rating of Cooking Mama.

TABLE I. RESPONDENTS’ RATING ON COOKING MAMA AND THEIR EXPECTATIONS

Field	Cooking Mama Rating	Expected Rating
Complex Gameplay	2.74	3.38
Easy to Understand Interface	4.32	4.56
Immersion	3.38	4.03
Reality	2.94	2.85
Educational	3.85	2.91
Hours of Content	2.94	4.00
Variety of Content	3.18	4.21

The respondents were asked to rate an expected mobile game and Cooking Mama on the fields of Complex Gameplay, Easy to Understand Interface, Immersion, Reality, Educational, Competitiveness, Hours of Content and Variety of Content. The ratings are calculated by summing up the total score for a certain aspect and dividing it by the number of respondents. Ratings are in a linear range from 0 to 5, with 5 being the highest. However, having a rating of 5 or higher than expected is not always the best result, as it can mean that it is too focused on a certain field.

According to the results of the survey, Cooking Mama lacks enough depth in the gameplay as it is very simple and repetitive. Players expect enough complexity and depth in a mobile game to prevent it from being repetitive.

Immersion is also rated lower than expected due to the mechanics of Cooking Mama. All foods are simple buttons with pictures and all features are disjointed.

The educational value of Cooking Mama is almost 1 rating higher than the expected rating. This is due to the nature of the game which pushes the players into learning new recipes by repeatedly cooking foods of different backgrounds.

Both hours and variety of content are rated very low compared to the expected results of mobile games. The design of Cooking Mama which puts emphasis on recipes and repeated cooking instructions does not provide much variety for players.

Other fields, which are easy to understand interface and reality, can be said to meet the expected results of the target audience. However, all other fields generally miss the targets set by the players.

IV. EXISTING SOLUTIONS

A. *Cooking Mama*

Cooking Mama is a cooking simulation game released on the Nintendo DS back in 2006 [14]. Although not the first cooking game ever developed, cooking mama enthralled the market with its unique charm and novelty of cooking with just taps and swipes. Players are tasked to cook a dish of their choice step by step, from cutting, flipping, frying and arranging different ingredients.

In Cooking Mama, the dishes available originate from a wide range of countries including, but not limited to, Japan, the United States of America, China, France and Italy. Players go through a variety of instructions for each food and may get grades ranging from bad to perfect for each step. Each food may have more than 10 steps. However, due to the nature of these steps, cooking is a repetitive process in the game.

Cooking Mama also comes with several mini games with leaderboards such as the highest amount of eggs crack, which gives competitive players a different mechanic to play with. However, Cooking Mama's lack of varying mechanics does not cater much to Bartle's Taxonomy of socializer, killers nor explorers. Cooking Mama's system of perfecting dishes relates best to players deemed as achievers.

B. *Chef Wars*

Chef wars is a battle game which features food discovery and crafting from around the world. Players are tasked on a campaign to prevent an evil chef from completing his plans

Released in 2017, chef wars take a different approach to cooking games, in which the players do not have to cook at all. Players only select the dish they would like to bring to the match and the game proceeds to do the simulation for the battle.

In chef wars, dishes originate from around the world with a heavy focus on European dishes. Players do not go through a

step by step cooking instruction guide but instead travel around the world and buy ingredients. The ingredients are then used with each other to have a chance in crafting a recipe.

In Chef Wars, players buy chefs which have limited amounts of slots for recipes and stats to battle other chefs. The chef's stats and food will determine the winner without the player's intervention. Due to this mechanic, socializers and achievers do not get catered as there is no activity required for them to act. As a result, this game only caters to explorers who wish to craft food and killers who would like to battle.

C. *Cook, Serve, Delicious*

Cook, Serve, Delicious is a simulation game released on Steam in 2013. Compared to the previous games, Cook, Serve, Delicious approaches the cooking genre with a restaurant simulation game. Players are tasked to cook food with the help of the keyboard corresponding to their foods. Players juggle between orders and customer happiness in order to clear levels.

Cook, Serve, Delicious does not have many food choices. Most of the food originate in western culture and consist of only the popular foods. Players are required to buy dishes with in game money to unlock more recipes. The cooking is similar to Cooking Mama; however, each food only requires two instructions. The food comes with several varieties which are bound to their first letter on the keyboard. Cooking often requires quick player reflexes to juggle the amount of orders.

Players are also able to compete in an infinite cooking competition without creating any errors. This game caters to both achievers and killers but not to socializers nor explorers. The gameplay is higher paced and less repetitive than Cooking Mama, but it then lacks the depth and amount of content to cater to the other half of player types.

D. *Order Up!*

Order Up! is another restaurant simulator game originally released on the Nintendo Wii back in 2008. Similar to Cook, Serve, Delicious, players are tasked to juggle orders and cooking without failures. The key difference is the system of orders which are handled differently. In Order Up!, players have a more complicated form of cooking which includes spicing, managing heat levels, and maintaining warmth for all the dishes.

The food choices in Order Up! is even fewer than the other games. Most of the dishes are western based food. To unlock new dishes, the player has to purchase them with in game money, similar to Cook, Serve, Delicious.

Like Cook, Serve, Delicious, this game caters more to the players of type achiever and killer, due to its nature. Both socializers and explorers do not have much features appealing to them.

V. SOLUTION DESIGN

A. Game Concept

The proposed game is developed to cater to gamers who enjoy casual, short and long-term games. The game attempts to combine several key mechanics, including but not limited to, recipe discovery, loot boxes and juggling between orders. The game also heavily focuses on Indonesian cuisine, providing a subtle educational content to the player base. With these features in mind, the game is developed for Android platforms for a more casual audience. In conclusion, this project will attempt to fulfill the target audiences' expectations from the survey result [2].

B. Game Mechanics

1) City System

The current game is developed with Indonesia's map. Several cities with unique foods have been added to the game's database. Each major city has a campaign, and exploration feature while minor cities do not have campaigns

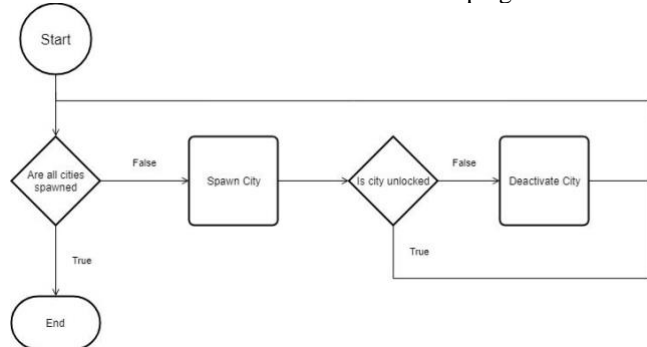


Fig. 3. City System Flowchart

2) Menu System

The Menu System for the campaign allows the players to change their menu for the day (campaign). Players can bring 5 dishes each day. The amount of orders in the campaign is determined through the menu. Bonuses are added into the game's formula for perks such as bringing the food that originate in the same city.

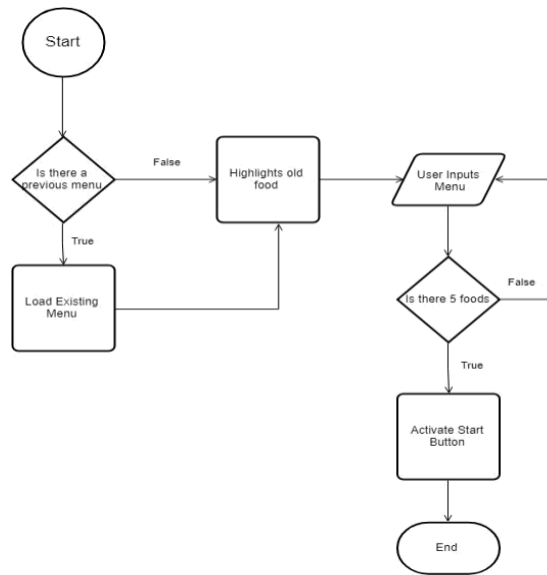


Fig. 4. Menu System Flowchart

3) Cooking System

Dishcover consists of several cooking instructions such as frying, boiling, and grilling. Different cooking activities may require different phone sensors such as touch screen and accelerometer.

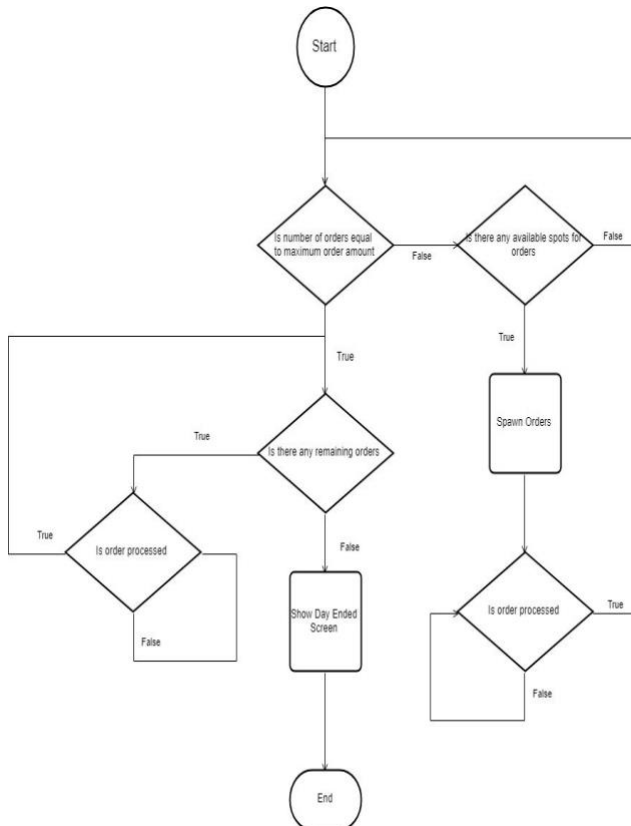


Fig. 5. Cooking System Flowchart

4) Order System

Orders are spawned during the cooking day based on the menu setup. Orders get processed via cooking for the players to score points. If an order is left unattended too long, the order will disappear.

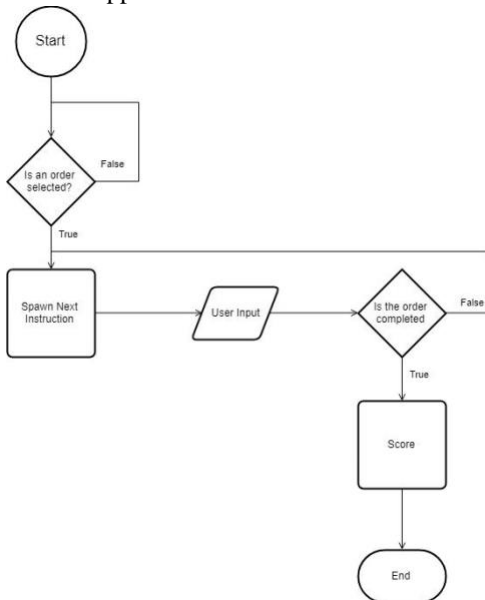


Fig. 6. Order System Flowchart

5) Ingredients System

Ingredients in Dishcover are in the form of cards. They are mainly unlocked via loot boxes and rewards. Ingredients are categorized based on their rarity which is determined by the number of recipes that use it. Rarity is divided into 5 tiers from common to legendary.

6) Recipe System

Recipes are given to players in the form of vague clues. Players select a recipe clue which takes them to the crafting screen. The player then drags up to 4 ingredients to craft the recipe. Regardless of failure or success, the ingredient will be used up.

Recipes can also be upgraded which provides more points in the campaign upon successful cooking. Upgrading the recipe to level 2 requires 3 more successful crafts while upgrading to level 3, the maximum level, requires crafting the recipe 10 more times.

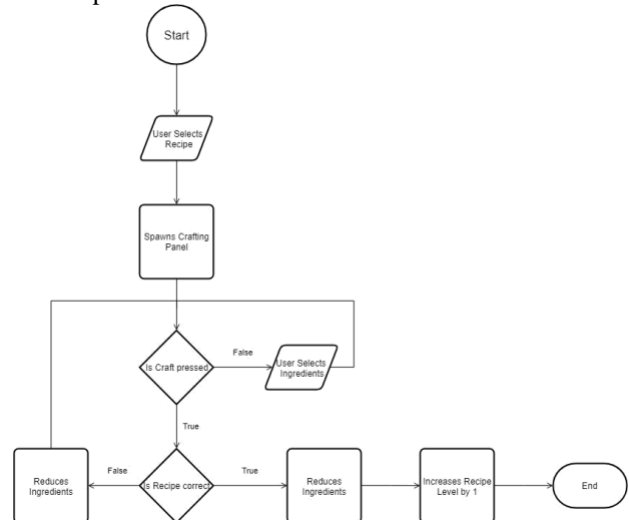


Fig. 7. Recipe System Flowchart

7) Money System

There are 2 currencies in the game, gold and gems. Gold is the general currency easily obtainable through the campaign. Gold is usually used to purchase ingredients and loot boxes. Gems are premium currency that is harder to obtain. Gems are used to purchase premium loot boxes.

8) Shop System

Shop system is for players to obtain ingredients and premium currencies. There are 3 tabs for shops, daily, special and premium. In daily shop, players get a choice of 3 random ingredients to purchase every day. In special shop, players can purchase different loot boxes which provides different ingredient ratings. The premium shop is where the players can purchase currency.

9) Encyclopedia System

The project also has an encyclopedia feature. Ingredients and recipes available in the game will have an encyclopedia page. Information such as the description, name and origin will be available for players to read.

VI. TESTING

A. Unit Testing

Unit Testing refers to the process of checking the game for errors and making sure that the game can be played per module or unit. This process is done by the development team to immediately discover important errors.

B. Survey

An online survey via Google Forms was set up to record responses from the testers [30]. Similar to the pre-survey, the same ratings were asked to the players. 64 respondents answered the survey which was shared the same way as the previous surveys. Following the initial survey, the average rating for each field is calculated and used as a basis for scoring.

TABLE II. RESPONDENTS' RATING ON DISCOVER AND THEIR EXPECTATIONS

Field	Dishcover Rating	Expected Rating
Complex Gameplay	3.47	3.38
Easy to Understand Interface	4.30	4.56
Immersion	3.66	4.03
Reality	2.91	2.85
Educational	3.23	2.91
Hours of Content	3.55	4.00
Variety of Content	4.23	4.21

VII. CONCLUSION

There are hundreds of games appearing in the market every month. However, there is currently an unfed demand for cooking games that is unsatisfied [2]. This is especially true for cooking games based on Indonesian cuisine. Current games such as Cooking Mama have also lost their audience due to the lack of changes in aspects such as the variety of content and complexity. This game project attempts to fulfill players' expectations of a mobile cooking game while providing a different form of experience.

The game adds modern mechanics such as loot boxes and provides information on Indonesian food which adds a unique flavor to a cooking game. As a result, the game has reached close to the desired expectations in all the aspects recorded. And with this information, the author has proven that there is currently a demand for such a game.

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