

# User Experience Analysis on Mobile-Based MOBA Games Using UX Curve Method

(Case Study: Mobile Legends)

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**Abstract**— Nowadays, one of the most commonly used form of entertainment is games. For this reason, every game developer tries to produce the perfect game by providing exciting gameplay, a friendly interface, and gorgeous graphics. Although many developers fail and end up closing their games, there are also some developers who are successful in doing so. One developer who is successful and very active in updating their game is Moonton, with a game called Mobile Legends: Bang Bang. Related to this, researchers want to analyze what kind of experience that the users feel when playing this game so that many users in Asia, especially in Indonesia, download it. To achieve this goal, it requires the UX Curve method which can be used to evaluate user experience over a period of months without taking a long time. With this study, the researchers hope to find out the user's point of view and identify the reasons in the form of features that are favored by users as a proof of why this game is popular. The results of this research can serve as information for developers to develop similar games. In addition to information for developers, readers can also gain insight into the implementation of the UX Curve method for MOBA games. After the research is concluded, it turns out that updates to the game greatly affect the improvement of the general user experience over time. This is evidenced by the number of curves that increase has a greater number of 9 curves, while the stable and decreasing curves only amount to 3. In addition to the number of curves or quantitative data, user reasons are also taken into account as semi-quantitative data. The highest number of user positive reasons is related to ease of use, which is 51 reasons. The majority of user reasons were related to the functionality of the game such as the ease of using new characters and adapting to the game changes.

**Keywords**—user experience, UX Curve, Mobile Legends: Bang Bang, Multiplayer Online Battle Arena.

## I. INTRODUCTION

In this modern age, the forms of entertainment we can get are very diverse. Watching videos or movies, exercising or shopping through digital apps, and playing games. It is common for people to spend hours in front of computers, gadgets, or game consoles to entertain themselves and refresh their minds by playing games. Based on this, every game developer is competing to produce the best games for users by offering exciting gameplay and captivating graphics. They want to give users a good experience so that they feel comfortable playing them.

While many developers fail and end up shutting down services on their games, quite a few survive, and successfully

deliver their products to the community. An example of a developer that is successful in developing games and very active in updating them is Moonton. Mobile Legends: Bang Bang, is one of the games developed by Moonton and released in 2016 with a Multiplayer Online Battle Arena (MOBA) genre and very popular in Southeast Asian countries. This statement makes the author want to analyze the user experience while playing this game, so that the author knows why the game is downloaded by many users in Asia, especially in Indonesia. User experience is a person's response and point of view after using a service, system, or product [1]. Over time, the user experience of a product can change [2] [3]. As a result, evaluating user experience in a short period of time may produce inaccurate data on how people feel about the application.

Knowing this, a suitable method is needed to evaluate user experience over a long period of time. The method used by the author in evaluating long-term user experience is the UX Curve method. The UX Curve method is a retrospective evaluation method that can be used to qualitatively investigate user experience over a period of time [4].

With this research, it is hoped that the author can find out the reactions and perspectives of users to the game over time through the user experience analysis that has been carried out. In addition, it is hoped that researchers can identify reasons in the form of features that users favor as evidence of why this game is popular. By utilizing the data and information in the research, the author hopes to see game developers become more developed and not suffer bankruptcy due to lack of players in the future.

## II. LITERATURE BASE

### A. Related Research

The main reference for the selection of methods in this case is the journal by Eirini Moschou from the Technological Educational Institute of Kavala and Panagiotis Zaharias from the Open University of Cyprus. In this journal, UX Curve is proved to be effective in evaluating the user experience of Massive Multiplayer Online Games (MMOGs) as well as MOBA games, specifically "League of Legends". By using 6 modified dimensions, namely General UX, Degree of Usage, Ease of Use, Immersion, Social Interaction, and Engagement, this method can provide accurate results on evaluating the user experience of the game. In their journal, 54 curves were obtained from 9 respondents with an age range of 18-20 years

who experienced an increase in each dimension. For example, the General UX dimension obtained an average reason of 6.3 with 4.8 positive and 1.6 negative. Other dimensions have their own values depending on the reasons given by respondents.

Due to the same genre of the research object, the dimensions used in the author's research and Eirini Moschou's research are similar. The only difference is in the merging of the Engagement and Degree of Usage dimensions. Engagement can be measured based on the degree of usage. This reason makes these two aspects combined to prevent repetitive data from being extracted [5] [6].

#### B. User Experience and Long-Term User Experience

Long-term user experience is the experience that users feel when or after using a product for a long time. Over time, the user experience of a product can change. Evaluating the user experience over time can also be used to understand the behavior of a gamer. User experience covers every aspect of how users interact with a company's services or products. User experience itself can be said to be good if users are able to meet their needs when using the service or application without any interference or obstacles [7].

According to Karapanos, et al. (2010) there are several methodologies that can identify changes in user experience over time. These methodologies include:

- Cross-Sectional: A study conducted by partitioning users into groups of different levels. Unspecified time can be an option to evaluate long-term user experience.
- Longitudinal: Research conducted over a period of time according to the needs of the researcher. The research requires users to report all their experiences when using the product or service that is being studied.
- Retrospective Reconstruction: The way this methodology works is that users are instructed to remember and convey their most memorable moments at the specified time in as much detail as they can. Therefore, the data obtained is only the experiences and important moments obtained from the user's memory.

#### C. UX Curve

UX Curve is a method used to retrospectively evaluate long-term user experience. The way the UX Curve works, researchers show in advance about the product overview in a certain period of time so that users can recall the impressions and important details that were felt about the product at that time [8]. The dimensions evaluated in the UX Curve are:

- Attractiveness: Related to how attractive the product or app in the eyes of the user.
- Ease of Use: How easy it is for users to interact with an application or product.
- Degree of Usage: The amount of times a product or application is used within a specified period of time.
- Utility: Involves the suitability of the application features to the user's needs.
- General UX: Any experiences that users feel in general when they are using an app or product.

Using the above references, the research conducted by Moschou & Zaharias also used the same method with the MMOGs (Massive Multiplayer Online Games) game object. Since games and applications are similar but different objects, Moschou & Zaharias adjusted the dimensions of the UX Curve to match the objects and respondents who participated. The following are the dimensions used by Moschou & Zaharias in their research:

- Social Interaction: Evaluates how easy it is for users to interact with other users while playing the game.
- Ease of Use: How easy it is for users to interact with the game.
- Degree of Usage: The amount of times the game is used within a specified period of time.
- Engagement: It is an improvised form of the degree of usage dimension because it addresses similar and broader issues. This dimension wants to know how much time, effort, thought and resources the user has put into the game.
- Immersion: This dimension refers to how much the game can make the user feel the excitement generated. This is usually described by the player's emotions while playing.
- General UX: Any experiences that users feel in general when they are playing the game.

#### D. Mobile Legends: Bang Bang

Mobile Legends: Bang Bang is a MOBA (Multiplayer Online Battle Arena) game released by Moonton in 2016 that involves 2 teams with 5 members. Each player is required to choose a suitable hero to make the best team combination. The goal of each team is to destroy the opposing team's base while defending their own team's base.

### III. METHODOLOGY

As the main methodology of the previous study, I chose this methodology in carrying out my research. I modified some methods with the help of my supervisor. The flow of the research starts from literature study, preparation for data collection, data collection, data processing and analysis, as well as conclusion and suggestions.

#### A. Literature Study

The first step is a literature study to learn about the methods used, user experience, and the game Mobile Legends: Bang Bang. The literature that the author uses in this research, is online sites, journals, articles, previous research, and videos related to the topic of discussion.

#### B. Preparation for Data Collection

This stage contains the preparation of things needed for data collection. Examples of preparations that must be made are the selection of respondents, making schedules, selecting features, making supporting media in the form of images or videos that are useful for recalling user memories, preparing questionnaires, making curve drawing templates, and preparing interview venues. In determining and selecting respondents, this research involves random sampling method in Brawijaya University to search a respondents with an age range of 20-25 years so that the data generated remains relevant and there is no abnormal data due to age differences

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that are too far away. The number of respondents was determined using the data saturation technique where after collecting data on an individual, the author will directly compare the data with the previous data. If a significant difference is still found, then the author will look for the required respondents again. The number of matches has not been considered for this study.

The schedule of interviews to be conducted is subject to change and can be much different due to the current pandemic conditions. The schedule will be presented in the next chapter.

The feature selection referred to in this section is the selection of the game version used to assess user experience. In this case, author want to use patch 1.5.08 which was released on September 24, 2020 on the original server to patch 1.5.52 which was released on February 2, 2021 on the original server. The selection of this version as the object of research was made because there was a major update to the game.

In the making of assistive media, the author uses the open-source Shotcut application by sequentially creating footage of features that appear in each patch. Not only showing the new features that were fixed, but it will also be shown about the new modes, new heroes, and miscellaneous that were released at that time. This aims to make respondents recall memorable moments whether positive or negative at the time.

### C. Data Collection

After the preparation has been completed, the next step is to execute the plan. At the data collection stage there are 3 things that must be done, consisting of:

- Initial Questionnaire: The author asked about respondents' demographics, initial impressions initial impressions, expectations, motives for using respondents towards the application.
- Curve Drawing Templates: In curve drawing, the author will use the media that has been prepared beforehand. When the media is displayed and the respondents draw the curves, the author will explain to the respondent about the features that appear on the patch.
- Final Questionnaire: Final Questionnaire does not have much relationship to the curve, so researcher can skip this step.

### D. Data Processing and Analysis

After all the curves are obtained, the author categorizes the curves into three which are improving curves that have a lower starting point than the end point, deteriorating curves that have a higher starting point than the end point, and stable curves that have the same starting point and end point.

In addition to the curves, the data collection is also done on the respondents' reasons when their experience changes. The data will be collected and the reasons will be categorized into pragmatic (functionality) and hedonic (appearance) reasons which are further divided into positive, and negative.

### E. Conclusion

Conclusion is the final stage of this research. The conclusion explains the results of the research conducted in a brief and concise manner, as well as the answer to the problem. In addition to summarizing the research results, this

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stage also contains suggestions and recommendations for further similar studies.

## IV. DATA COLLECTION AND PROCESSING

The list of respondents who have been interviewed and drawn curves can be seen in Table 1. . These users are the results obtained from random sampling of final year students.

TABLE I. LIST OF RESPONDENTS

UID	IGN (In Game Nickname)	Number of Matches
U01	Rokuban	3.263
U02	×DedSec×	2.492
U03	Ryuvelyz	892
U04	Alliace	1.111
U05	Laplace.	8.048
U06	tanu	769
U07	blackpink	4.975
U08	♡ ღτσρα ♡	2.843
U09	Black Diamond	9.984
U10	ADM17	3.249
U11	SOBRUM	777
U12	Ducktail	790

After all the curves are obtained, the author categorizes the curves into three which are improving curves that have a lower starting point than the end point, deteriorating curves that have a higher starting point than the end point, and stable curves that have the same starting point and end point.

### A. Curve Drawing

There are 5 curves drawn by the users. The following Figures 1 to 11 will present the curve drawing that has been done by each user.

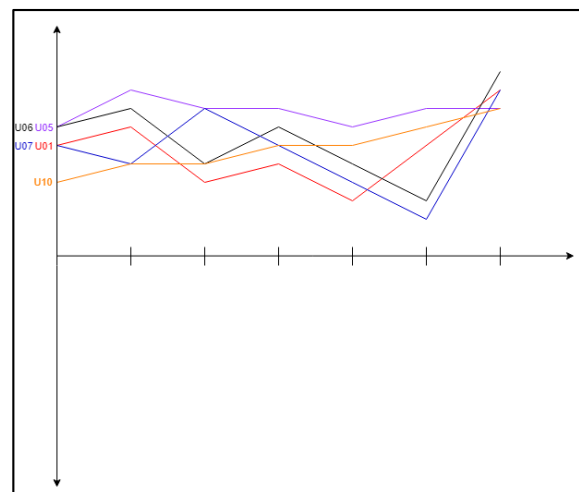


Fig. 1 Ease of Use (Improving Curve)

The first curve that illustrated in figure 1 is the improving curve for the ease of use category, which illustrates the increase from the beginning of the study to the first month. In the last month there was also an increase due to changes in the

draft pick system and ease of communication with the custom signal feature.

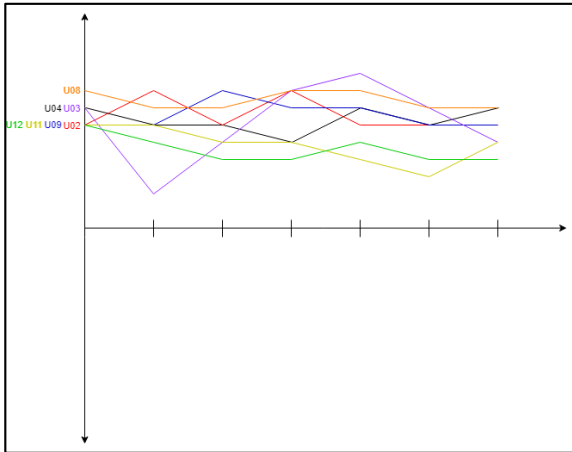


Fig. 2 Ease of Use (Stable and Deteriorating Curve)

As for the dynamics of the deteriorating ease of use curve that illustrated in figure 2, the initial deterioration occurred because some users had a hard time accepting the new UI. In the 5th-6th month, the game felt more competitive due to the update of new heroes that were too strong, the balancing game of playing groups meeting with other groups of players, the addition of tire slots, the new communication features made it difficult for users to enjoy.

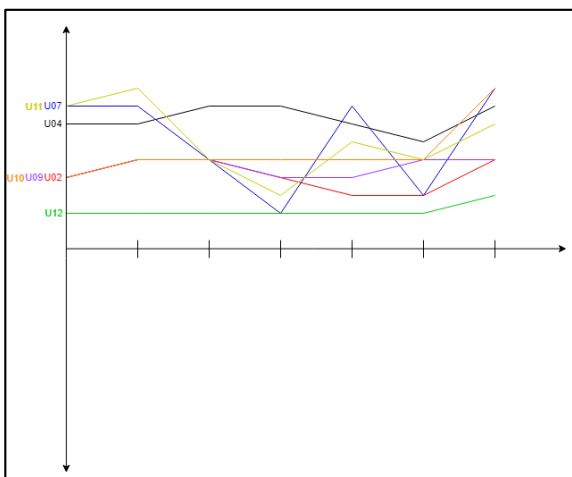


Fig. 3 Engagement (Improving Curve)

Figure 3 illustrated an improving engagement graph, the majority of users are looking forward to updates every month, but due to random sampling within the same class of final year students, most users have their own busy schedules.

In the last month, many users had completed their tasks, so the usage rate went up, real money was used to buy in-game cosmetics, and so on.

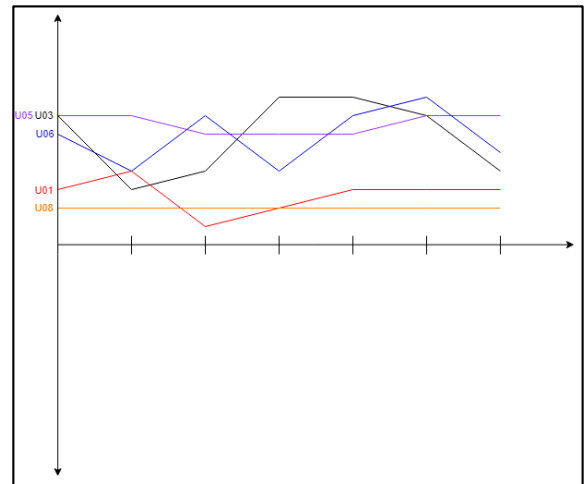


Fig. 4 Engagement (Stable and Deteriorating Curve)

For deteriorating engagement curve in figure 4, not all users are equally busy, so there are some users whose interaction levels are different in certain months.

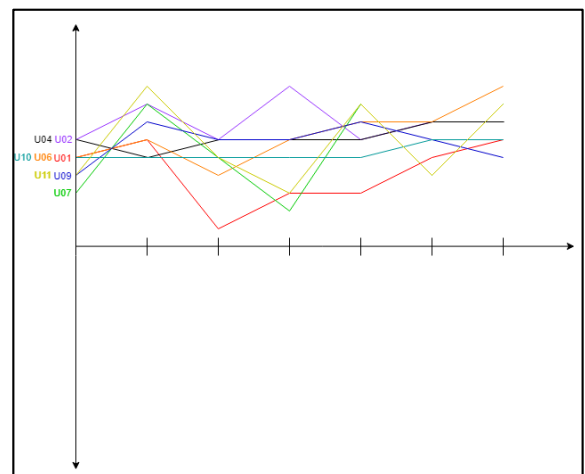


Fig. 5 Immerse (Improving Curve)

The updates that were made at the beginning of the study triggered the immersion curve in figure 5 to rise. Improvements to the game's visuals, changes to the way of playing, new strategy settings, and so on are what caused the immersion curve to rise in the first place.

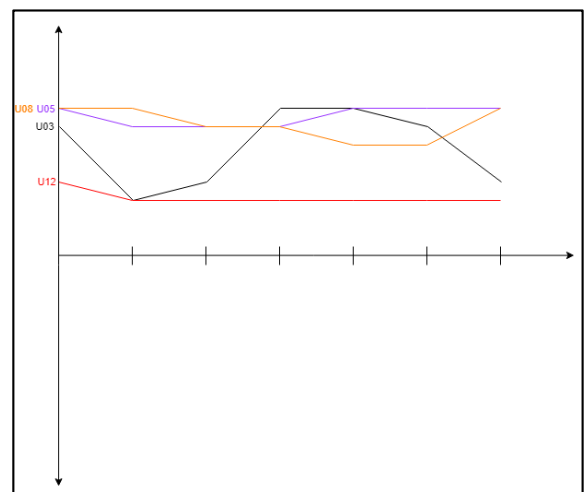


Fig. 6 Immerse (Stable and Deteriorating Curve)

After the discussion of the improving curve in figure 5, the curve that is in the opposite category in figure 6, has decreased or stabilized, due to some respondents who overrated the game graphics in the beginning, but experienced boredom in the following months.

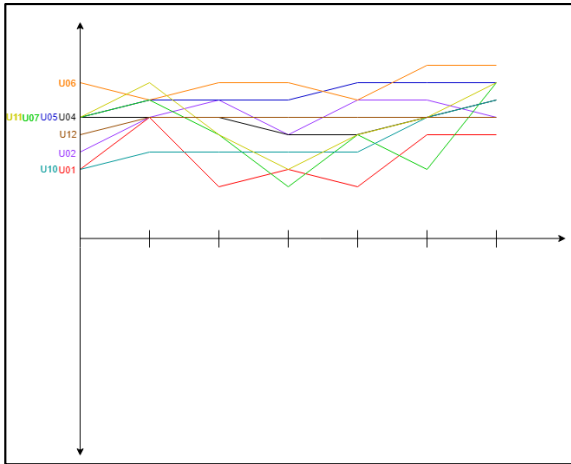


Fig. 7 General UX (Improving Curve)

Looking at the improving curve shown in figure 7, the reasons given by users are generally just a repeat of the aspects that most affected their experience. In general, users were satisfied with what happened in the first month of the study. The massive system, UI, and gameplay updates really paid off.

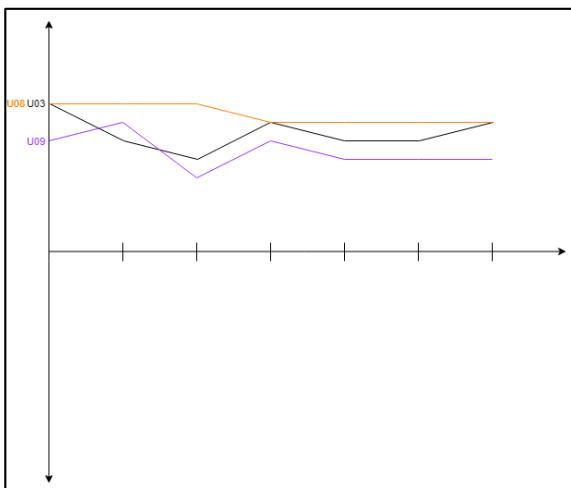


Fig. 8 General UX (Stable and Deteriorating Curve)

In the deteriorating curve in figure 8, it illustrates that the later months are not as sweet as the first month because of massive updates that spoil users too much can make users bored with what happens in the following months. However, the last month of the study saw updates that changed the competition in the game. Communication features, many new heroes, one more ban slot, and so on are enough to be enjoyed by the users' desire for competition and challenge.

Figures 9 and 10 below this paragraph illustrate the social interaction curve in the game, which is less noticeable each month. This is because game development rarely makes changes to the in-game communication features.

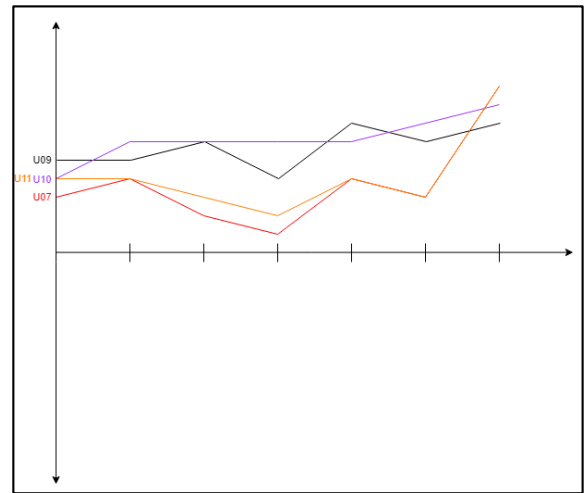


Fig. 9 Social Interaction (Improving Curve)

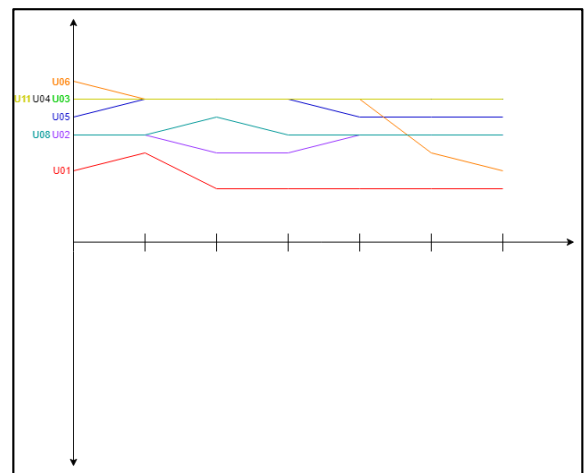


Fig. 10 Social Interaction (Stable and Deteriorating Curve)

After discussing all the curves, the division or identification of reasons can be seen in the discussion below. This identification aims to help the reader understand the user's reason more specifically.

### B. Reason Identification

After the curve drawing phase, there will be an identification of the reasons expressed by users according to the aspects and types of reasons belonging to pragmatic (functional-related reasons) or hedonic (appearance-related reasons). The following is a list of reasons from users.

TABLE II. LIST OF POSITIVE REASONS

UID	Reason	Dimension	Pragmatic /Hedonic
U01, U02, U06	The application's ease of use (Visual)	Ease of Use	H
U01, U06, U09, U10	Playability	Ease of Use	P
U02, U08, U10	Changes to the draft pick system	Ease of Use	P
U03, U04, U05, U07,	User friendliness in utilizing heroes	Ease of Use	P

U08, U09, U10, U11			
U01, U02, U03, U05, U07, U08, U09, U11, U12	The game atmosphere feels real	Immerse	H
U01, U05	Changes to the draft pick system	Immerse	P
U02, U03, U04, U05, U06, U07, U09, U11	Visual effect changes	Immerse	H
U05, U06, U09, U10	Skins/cosmetics	Immerse	H
U01, U05, U06, U08, U09	Bug fixes (qualitative)	Immerse	P
U10	Lane changes	Immerse	P
U01, U03, U11	Spend a lot of time because of interesting updates	Engagement	H
U05	Bug fixes (quantitative)	Engagement	P
U06, U11	Graphic changes	Engagement	H
U07, U10, U11	Good skins/cosmetics	Engagement	H
U01, U06, U07, U11	Changes to communication features during the draft pick phase	Social Interaction	P
U06, U10	Changes to communication features in battlefield	Social Interaction	P
U01, U05, U09	Lane changes	General UX	H
U01, U11, U12	Hero revamp	General UX	H
U02, U03, U04, U11	Favorite heroes	General UX	H
U08, U09	Game changes	General UX	P
U10	Game impressions	General UX	P

After the list of positive reasons, the next is a table containing users' negative reasons.

TABLE III. LIST OF NEGATIVE REASONS

UID	Reason	Dimension	Pragmatic /Hedonic
U03, U04, U05, U09, U10, U11	Hero complexity	Ease of Use	P

U04, U08, U09, U10, U11, U12	Unbalanced hero power	Ease of Use	P
U06, U08, U09, U10	Gameplay changes made the game difficult	Ease of Use	P
U06	Communication feature changes made the game difficult	Ease of Use	P
U02, U04	Ordinary cosmetics	Immerse	H
U03	Visual effect changes are no different from before	Immerse	P
U05	The updates didn't increase the desire to play	Engagement	H
U04, U09, U10	In-game communication does not improve the gaming experience	Social Interaction	P
U06	Post-game communication does not improve the game experience	Social Interaction	P
U03, U12	Hero updates are less interesting	General UX	H
U04	Changes in appearance are less impactful	General UX	H
U05, U06	Game specifications are too high due to new updates	General UX	P

## V. RESULTS AND DISCUSSIONS

### A. Curve Analysis

The data that has been identified will be calculated and analyzed.

TABLE IV. NUMBER OF CURVES

Dimension	Curve		
	Improving	Stable	Deteriorating
Ease of Use	5	4	3
Immerse	8	2	2
Social Interaction	4	2	6
Engagement	7	2	3
General UX	9	3	0

It can be seen in the table, there are more improving curves compared to stable and deteriorating curves. This proves that a lot of user experience has improved when playing the Mobile Legends game: Bang-Bang.

In general, users were satisfied with what happened to the game in the first month of research. The UI, gameplay, and system updates really paid off. However, the following months were not as sweet as the first month because massive updates that spoil users too much can make users bored with what happens in the following months. In the last month of the study, there were new updates to the game that changed the entire game state. Communication features, many new heroes, one more ban slot, and so on are enough to be enjoyed by the souls of users who really want competition and challenges.

### B. Reason Analysis

The following table shows the reasoning analysis divided into positive and negative pragmatic and positive and negative hedonic.

TABLE V. NUMBER OF REASONS

Dimension	Pragmatic		Hedonic	
	Positive	Negative	Positive	Negative
Ease of Use	51	42	0	0
Immerse	3	0	8	2
Social Interaction	11	3	29	2
Engagement	7	4	0	0
General UX	13	0	3	6
Total	184			
Mean (n=12)	15,3			

In the table, it can be seen that positive reasons have more number than negative reasons. From this statement, it can be concluded that the updates made to the game features of Mobile Legends: Bang Bang really helps improve the user experience. There are several dimensions that have less average reasons because the reasons stated are factors from outside the game. Examples of reasons put forward by users but not included are, reasons for lack of income that prevent users from purchasing cosmetics in the game, or because of busyness that makes users reduce the portion of playing games. Other reasons that were not included included features that were too standard, and no significant updates in the following month. Due to the lack of discussion, users prefer to come up with reasons on the other dimensions rather than being forced into the requested dimension.

The following graph is a depiction of the data from each curve along with its average reason to help illustrate the recapitulation of user reasons.

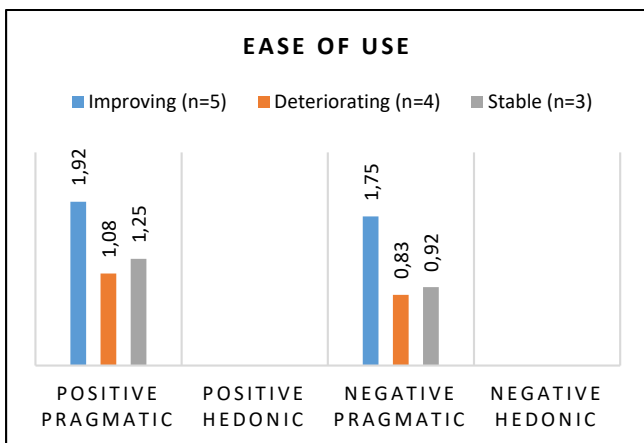


Fig. 11 Bar Graph of Reasons (Ease of Use)

The reason data submitted by users on the Ease of Use dimension of the game is 93 reasons consisting of 51 positive reasons, and 42 negative reasons. From this data, it was found that the average reason stated by each user was 7.75, consisting of an average of 4.25 positive reasons, and 3.5 negative reasons. From the figure, the most obvious thing is that positive reasons for gaming always have a negative side as well. This was the case for every user, whether they had an improved or deteriorating experience. The most positive reason stated by users was about the ease of use of the hero or character used in the game.

The negative factors mentioned in the ease of use dimension exist every month. Every player tries to find the weak side of the newly released heroes.

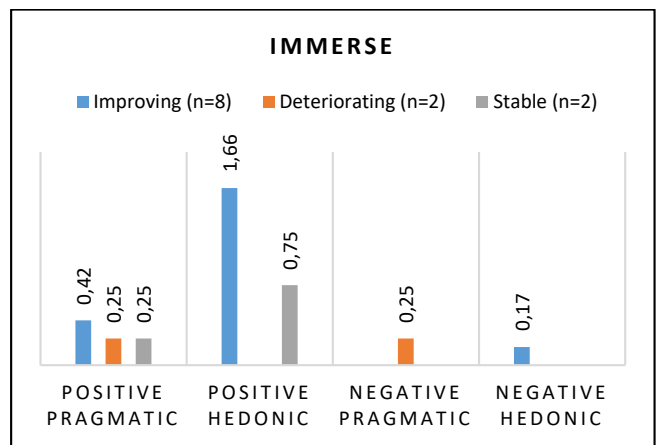


Fig. 12 Bar Graph of Reasons (Immerse)

The reasons submitted by users in the Immerse dimension are 45 reasons with 40 positive reasons and the rest are negative reasons. From this data, the immerse curve has an average of 3.75 reasons consisting of an average of 3.33 positive reasons and 0.42 negative reasons. In the immerse dimension, users emphasize more on the hedonic factor of the game. The increase in the curve can be found in almost every user because the starting point is the month when the major update was announced in the Mobile Legends: Bang Bang. The only negative side that can be found in the immerse dimension is that the next update is too ordinary and does not meet the expectation of the player.

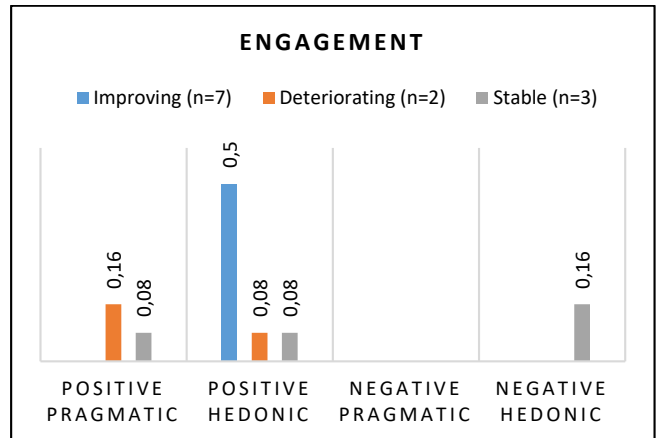


Fig. 13 Bar Graph of Reasons (Engagement)

Due to the lack of interest in purchasing paid game content, it is very difficult to find any user experience related data on the engagement dimension. It's not that the content is bad or unsatisfying, but Moonton sets a fairly high price for each item it offers. Knowing this fact, the data obtained contained a total of 13 reasons, consisting of 11 positive reasons and 2 negative reasons. As can be seen in the graph, the overall average reason is 1.08, which consists of 0.92 positive reasons, and 0.16 negative reasons.

Users in this dimension talk about many things from the money spent, to the time and energy used to play. The real money used ranged from 10000 IDR to 250000 IDR to buy in-

game currency called diamonds in the months that had the most interesting updates.

In addition to discussing the money spent on gaming, users in this engagement dimension were also asked to discuss the amount of time spent playing the game. The average age of users who have been interviewed is 22-23 years old. Users at this age have started to enter their busiest age. Working, earning a degree, and studying are the daily lives of the users.

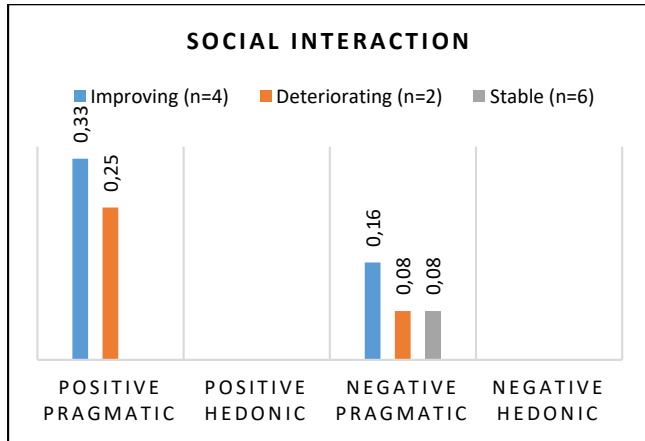


Fig. 14 Bar Graph of Reasons (Social)

Can be seen in the graph, very few users expressed their reasons. Out of 12 users, only 11 reasons were obtained, consisting of 7 positive reasons and 4 negative reasons. The average number of reasons obtained is 0.92 which consists of 0.58 positive reasons, and 0.33 negative reasons.

For many years, the communication system in the game remained unchanged. This caused many users to be unaware of the small changes to the in-game communication features. Until the 6th month, there was a massive communication change in the game.

With the new features on the communication aspect, there are some users who are starting to feel the benefits. Even so, the number of users who knew and felt the benefits did not outnumber those who did not realize them. Also within this dimension, there were some users who discussed the negative side regarding in-game communication. The lack of restrictions on communication methods in the game made players more toxic than before. Spam emoticons, rude speech, quick-chats used for offensive purposes, and now there is a feature that makes players fight a hero.

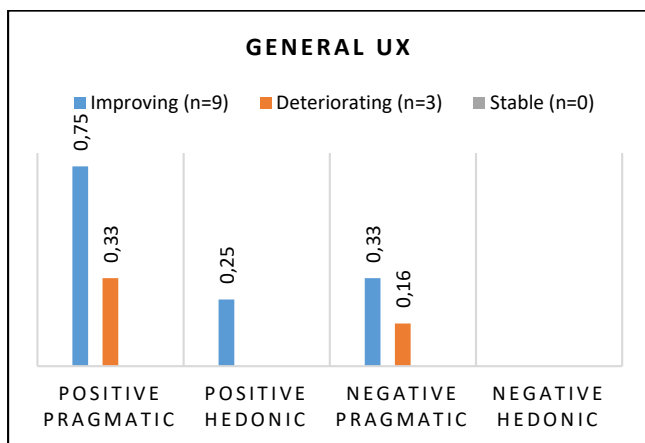


Fig. 15 Bar Graph of Reasons (General UX)

The majority of users were satisfied with the game. The number of reasons stated was 22 with 16 positive reasons, and 6 negative reasons. The average reason stated by each person was 1.83. For positive reasons, the average reason was 1.33, and the negative reason was 0.5.

Overall user feelings towards the game were only expressed through curves. The reasons given by the users were generally repeated from the previous dimensions that affected their experience the most. Although almost all users repeated their reasons, there were a few users who also expressed their interest in the gameplay of Mobile Legends: Bang Bang. For example, users talked about their favorite heroes that they often use, and the game interface that becomes more appealing to their eyes. Other than the positive reasons mentioned, there were a few people who expressed their dislike for the frequent updates. The most common reasons were that the game specifications are getting heavier and the interface is growing more confusing.

## VI. CONCLUSION AND SUGGESTION

### A. Conclusion

The updates that Moonton has made to the game Mobile Legends: Bang Bang from month to month within the research period are considered very satisfying by players or users. Total of 33 curves were categorized as improving curves. The dimension that was most perceived to improve during the research period was the general user experience dimension or General UX with the acquisition of 9 curves increasing, and 3 curves decreasing. This indicates that the updates made by Moonton as the developer of the Mobile Legends game: Bang Bang has the greatest influence on users' impressions of the game in general.

During the reason analysis, there were a total of 184 reasons consisting of 125 positive reasons (85 positive pragmatic reasons and 40 positive hedonic reasons) and 59 negative reasons (49 negative pragmatic reasons and 10 negative hedonic reasons) with an average of 15.33 reasons stated by each user (n=12). It can be seen that the highest average is held by positive pragmatic reasons with an average of 7.09 (n=12). This indicates that everything related to game functionality still plays an important role in improving user experience when compared to the graphics or appearance of the game.

The reasons related to functionality (pragmatic) that played the most role were found in the ease of use aspect. The reasons related to functionality (pragmatic) that played the most role were found in the ease of use dimension. There were 51 positive reasons in this dimension with an average of 4.25 (n=12), which means that the other dimensions combined only accounted for 2.84 reasons. The majority of users prioritize the ease of controlling certain characters (hero control), and also the ease of adapting to the environment in the game such as changes in the appearance of forest monsters, the addition of ban slot, and also the appearance of shield on the turret.

### B. Suggestion

Further research are expected to categorize users into several levels (such as professionals, beginners) in order to widen the author's vision to all kinds of user personas.

Request more complete demographic information such as start date and frequency of use. Only showing the number of matches cannot deepen the conclusion.



The time interval in conducting research is expected to be close to the time of submitting the results so that the relevance of the research is maintained.

Expand the age of respondents to get more perspectives, and hopefully use more specific features so that changes in the curve do not easily change context. This makes the user experience of certain features easy to read and root causes can be identified without much effort.

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