Comparing the Performance of Players Unknown Battle Ground (PUBG) Mobile App on iPhone X and Samsung S9 plus Smartphones

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Abstract
In this paper, we present the results of a comparative evaluation of the performance of the Players Unknown Battleground (PUBG) Mobile app on iPhone X and Samsung S9 Plus smartphones. The outcome indicates that Samsung S9 Plus performed better than iPhone X as perceived by players of the PUBG mobile game. This finding suggests that the quality of iPhone X for PUBG mobile app play should be enhanced to improve on the experience of its users

Keywords: *Mobile devices, PUBG mobile app, smartphones, software performance, usability, user experience*

1. Introduction

Apple Inc. and Samsung are the two major vendors of smartphones in the world and as expected in any market, there has been a high level of competition between the mobile devices of these companies, from the type of hardware being used and the design of their devices, to the kind of software being used in their devices, to user interfaces and interactivity and so on [4]. The mobile game, PUBG is used in this research because its usage touches all aspects of a mobile phone: the sound, speed, graphics, battery usage, microphone, communication, screen response, data usage etc. Apple was founded in 1976 by three men: Steve Wozniak, Steve Jobs and Ronald Wayne. Apple back then was just a garage in California, created with the intention of selling their Apple 1 Personal Computer, hand built by Wozniak. The Apple 1 barely qualified as a finished product, lacking any Human Interface Devices built-in such as a keyboard, or even a case. Five years after, the first Macintosh was designed. With the ground-breaking "1984" ad, Apple set themselves apart from the firms targeted in the advertisement: namely, IBM. The Mac was a revolution in personal computer design. It came with its own GUI (Graphical User Interface) and allowed for the use of a 'mouse'. We still consider the use of computer mice and a user-friendly GUI to be essential, more than 30 years later [8][10].

Android, Inc. was founded by Andy Rubin. In 2005, Google acquired it and then the team led by Rubin developed a mobile device platform powered by the Linux kernel. Finally, on November 5, 2007, the Open Handset Alliance, a business alliance of several companies which include Google, HTC, Intel, LG and other 76 firms unveiled itself. On the same day, the Open Handset Alliance also unveiled their first product, Android, a mobile device platform which was built on the Linux kernel version 2.6. The first commercially available phone to run the Android operating system was the HTC Dream, released on 22 October 2008. Samsung S9 is an android device. Samsung produced more S series phones with the most current product, as of the time of this research, being the Samsung Galaxy S9 Plus released 2018 with the android version 9.0. In the last quarter of 2017, Samsung sold 74.1 million units of phones [1]. When compared to Samsung, Apple has gained an edge over its visual identity. The strength of the iPhone's self-image is illustrated by a study conducted where it was revealed that "Apple's iPhone remains the smartphone with the greatest appeal for shoppers in North America". However, on certain occasions, Samsung has failed to ensure that there are no dents to its brand identity; in

following this aggressive strategy, "Samsung Galaxy note -4" competing with Apple introduced the biometrics finger scanning access security feature which was very sluggish and disastrous compared to "iPhone 6" and "6 plus". Samsung would have been better off without this feature unless otherwise they overcome the technical glitches. Apple is more adept at limiting their features to what is best and by "ignoring constructs that are not helpful" [5][13]. Samsung however has its strengths.

Player Unknown Battlegrounds (PUBG)[14] is an online multiplayer battle royale game developed and published by PUBG Corporation, a subsidiary of South Korean video game Company inspired by a Japanese movie "Battle Royale". The game is based on previous versions that were created by Brendan Greene's "Player Unknown" for other games using the film 'Battle Royale' for inspiration, and expanded into a standalone game under Greene's creative direction. In the game, up to one hundred players parachute onto an island and scavenge for weapons and equipment to kill others while avoiding getting killed themselves. The available safe area of the game's map decreases in size over time, directing surviving players into tighter areas to force encounters. The last player or team standing wins the round. Both versions are free-to-play and were released for Android and iOS devices on February 9, 2018. The

games had a combined total of 75 million pre-registrations, and ranked first and second on the Chinese iOS download charts at launch. Following a soft launch in Canada, an English version of Exhilarating Battlefield known as PUBG Mobile, was released. It is necessary to note that at the time of this research, no literature or open source comparison of functionalities in the mobile game, PUBG had been carried out comparing iPhone X and Samsung S9 Plus.

2. Methodology

2.1 Materials

iPhone X and Samsung S9: Apple and Samsung have these two phones as the best phones ever released as at the time of this study: iPhone X and a Samsung galaxy S9 Plus. The selection of the iPhone X and Samsung S9 devices was due to the fact that at the time of this research these particular smartphones where the latest and best products of Apple Inc. and Samsung respectively. The research was conducted at Veritas University, Abuja. Table 1 shows the key specifications of both phones used in the study.

Table 1: A Table showing the differences between the Specs of both devices

SPECS	iPhone X	Samsung S9
WEIGHT	174g	163g
SCREEN	5.8-inch OLED	5.8 -inch AMOLED
OS	iOS 11	Android 9.0
PROCESSOR	2.39GHz Hexa-core	2.7GHz Octa-core
RAM	3GB	4GB
STORAGE	64/256GB	64/256GB
DISPLAY	2436 x 1125(458ppi)	2960 x 1440 (570ppi)
RESOLUTION	1125x2436 pixels	1440 x 2960 pixels
REAR CAMERA	Dual – 12MP + 12MP OIS	Dual – 12MP + 12MP OIS
FRONT CAMERA	7MP F/2.2	8MP F/1.7
BATTERY CAPACITY	2716 mAh	3000 mAh
DUAL SIM	NO	YES
FINGER PRINT	NO	YES
WATER PROOF	IP67	IP68
4G/LTE	YES	YES

Players Unknown Battle Ground (PUBG): This mobile game was used in the study. It is an online game that needs internet connection (data bundle) to be played, most phones lower than the year 2015 cannot process the game due to the high amount of RAM space it takes in its processing, it requires a minimum of 1GB RAM and 3GB storage space. When playing the game, voice communication, chatting, screen response and battery usage are all involved in the game. Graphics, network

usage, screen size etc. are also used and therefore covers the major parts of a device making it suitable for an experimental comparison.

2.2 Users' Selection and Data Collection

Selection of experimental users: The users were chosen using the Quasi experimental method; choosing students purposively, those that have idea of both the mobile game and the devices and those that do not. Twenty (20) individuals were used in this study and are in different categories

i. Those that know and play the PUBG game but do not own a Samsung S9 or I Phone X (7 users)

ii. Those that own a Samsung S9 Plus or iPhone X but do not know or play the PUGB game (4 users)

iii. Those that own a Samsung S9 Plus or iPhone X and also know and play the PUBG game (4 users).

Three (3) have Samsung S9 Plus while one person had an iPhone X

iv.   Those that neither play the PUBG game nor own either of the mobile devices; Samsung S9 or iPhone X (5 users).

These individuals were of a certain age group: 18-23. There were more male users. This is because the PUBG game has a game play ratio of 80:20 male to female respectively. The selection took protective and security measures to avoid any damages on the phones used for this research owned by other students as these were quite expensive.

Data Collection: the following perceptive data were collected: 1) Affects: the emotions of participants, and how they feel about the game. If eventually they have played it before, how do they feel playing it on a Samsung S9 Plus or iPhone X; 2) Satisfaction, how satisfied and okay they are with the game; 3) Pleasure derived: was pleasure derived or not from the game; 4) Usability (especially for someone that has not used either of the devices)[2-3][6-7][9].

In addition, objective data were captured via the following metrics:

i. **Launch time**: for this particular experiment a stop watch was present, all other applications on the two devices were closed, the phones were restarted to clear the RAM space and cache data. Since the game uses network, the two phones were connected to the same network 4G/LTE Glo network mobile data. The launch time was recorded 3-4 times for accurate results. Samsung S9 takes 3 seconds while iPhone X takes 4.3 seconds. This implies that on PUBG game, Samsung S9 Plus is faster than iPhone X.

ii.   **Graphics/interface:** This comparison is great using Samsung S9 and iPhone X because the two phones are the only phones that can accept the highest graphics of the game; Ultra HD and highest frame rate. To get results after both games were launched, their graphics were both set to Ultra HD and the games were then restarted to observe the graphics and GUI on both phones. Samsung S9 supports 1080pixel and moves at 11.98 frame rate per second/W and the iPhone X has 12 frame rate per second/W

iii.   **Communication:** As pointed out earlier the game accepts communications both in chat and voice. To compare the delivery time and efficiency of the game on the two phones, the network stability was ensured. A stop watch was used also to observe the difference. A short message both on voice and chat was sent and the time taken to deliver and get a response was recorded. The iPhone X delivery time at 4G./LTE was 2.3 seconds and the Samsung S9 took 1.76 seconds to deliver. This indicates that on PUBG game, that Samsung S9 Plus is more efficient than iPhone X in terms of delivery time.

iv.   **Battery usage:** This was to check how many percent of battery on both phones would be exhausted after using the application constantly for a given

period of time. To check this, after the phones were fully charged100%. This was recorded in two ways with all other applications closed and with few applications open, the game was launched and played for 15 minutes on both devices and then closed. This was done with 4G/LTE network which is known to have more effect on battery and with both graphics set to the highest which also states in the game reduce graphics and frame rate if battery drains too fast. During this, it was observed that the iPhone X battery after 15 minutes ended up with a 91% and the Samsung S9 ended up with a 94%. This shows that the Samsung S9 Plus has better battery efficiency than iPhone X.
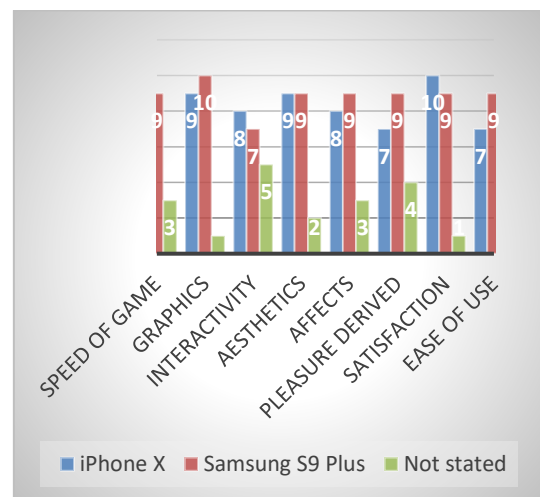
3.   Findings

Figure 1: below depicts the results of the analysis of data obtained from users' perceptive evaluation.

The chart above is an overview of the outcome of the study. Each point was observed by 20 players/ evaluators and result was collected. As shown above the comparison was made and recorded using the following:

i. **Speed of Game**: This was recorded by observing how fast the game is on both devices. These includes launch time, screen response, frame rate per second etc. After observation we had 8 users for the iPhone X Plus and 9 for the Samsung S9 with 3 people not being able to differentiate. Using the scores above, we can see that Samsung S9 is leading in terms of speed of game.

ii.   **Graphics**: This is basically just the device that has better display graphics. The device that shows the full High definition graphics of the game much better. Here we had 9 users for the iPhone X and 10 users for Samsung S9, with just 1 person unable to differentiate. Here Samsung S9 also leads but as seen above the gap is very little.

iii.   **Interactivity**: This is how the game communicates with users. A game from the same

producer and same type maybe different on an Android device and on an IOS device. So, the interactivity maybe different from one another and one may even be better. Here we had 8 users who said the iPhone X interacted more than the Samsung S9 which had 7 users. However, 5 users were neutral.

iv. **Aesthetics**: This is the beauty of the game. Which device presents an appreciable beauty of the game to the users? The users were given both devices to compare and here we had a tie of 9-9 users for both the iPhone X and Samsung S9. One person on the other hand said he/she could not get the difference.

v. **Affects**: As the users launch the game, how they react; how happy or sad they are, were observed and recorded. Eight (8) users were happy when the saw how it looked on the iPhone X and 9 were also happy with what they saw on the Samsung S9. The results are based on the excitement of users of both devices because no one will be sad after seeing such beauty in the game.

vi. **Pleasure Derived:** When the game was played on both devices, the pleasure the users derived from playing the game were captured. They were asked which device was much more pleasurable. Here we have 7 users that chose the iPhone X and 9 users for the Samsung S9 with 4 people without choices.

vii. **Satisfaction**: After playing the game on both devices, records of how the users were satisfied with the outcome of both devices and which one gave them the satisfaction they needed was made. Ten (10) users indicated they were satisfied with the outcome of the game on iPhone X and 9 preferred the Samsung S9 device with just one user with no choice.

viii. **Ease of use:** This is the ease of use of the game on the devices. As stated, earlier applications of the same type may appear differently on two different operating systems; in this case IOS and Android. Nine (9) users confirmed that Androids Samsung S9 is much easier than Apple's iPhone X which had 7 users.

Overall, the results of the study points to Samsung S9 Plus being perceived to perform better than iPhone X in almost all the metrics captured and examined. This implies that to improve users/players perception about iPhone X, the observed gray areas should be addressed and improved upon.

4. Conclusion

The evaluation of iPhone X and Samsung S9 indicates that more users would prefer playing PUBG game on Samsung S9 than on iPhone X as the former presents and offers a better experience to players. This implies that an improvement in the design of iPhone X is needed in other to enhance the PUBG players' perceptions about the phone. It is also recommended that: i) The mobile game Players Unknown Battle Ground should be made available for lower phones and less stronger phones. This can be done by minimizing the capacity and requirements; ii) Communication with the iPhone X should be made easier and minimizing applications should be possible without closing the game; and iii) Battery usage in the iPhone X should be optimized for the playing of the game..

The study's limitations are as follows: i) The experiment was done quickly in order to save users time; ii) The users were chosen from a certain age group of older teenagers and young adults and consisted of only students; iii) The comparison was done using just one application, the Players Unknown Battle Ground; iv) There were no automated ways or methods to calculate time results. Timing was done manually by humans and so results may not be fully accurate; v) The mobile phones used were not new. Future work will attempt to assess the quality of service of latest models Samsung and iPhone smartphones via other interactive applications on two or more interactive apps for a more robust comparison.

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