IMPLEMENTATION AND SIGN TEST ANALYSIS FOR MEASURING AR EFFECTIVENESS AS PROMOTION TOOL

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Abstract

Many smartphone entrepreneurs compete to promote various brands of smartphones. Conventional promotion systems become a mainstay for almost all smartphone entrepreneurs. As a result, sales turnover tends to decrease because it promotes the same goods in the same way. This research helps improve the promotion system peacefully using technology that can be run through the smartphone itself. Augmented Reality (AR) is technology that is the view of the physical world collaborated between reality and 3D virtual image. AR technology is designed on smartphone models to be an application running on the android platform and built on the Unity 3D program. The AR app will be tested on an android device with 3 different versions using Black Box testing. In addition, AR impact analysis is done on smartphone sales to see the response of potential customers to promotion system. The analysis is done by Sign Test method. Over all, the results of this study indicate that the application of AR is successfully tested on all versions of android and the analysis of this impact by Sign Test is good enough to smartphone entrepreneurs promotion system and get a pretty good response from prospective customers.

Keywords: AR, Android, Unity 3D, Black Box, Sign Test.

1. Introduction

The rapid development of smartphones indicates that the people's need for smartphones is also increasing sharply. High demand and competition cause smartphones to be offered vigorously through promotions. Conventional promotional systems become a mainstay for almost all smartphone entrepreneurs. As a result, sales turnover tends to decrease because it promotes the same goods in the same way. It also happens to more than 10 smartphone entrepreneurs in Marpoyan Damai district. Therefore, this research helps improve the
promotion system of Marpoyan Damai smartphone entrepreneurs by using technology that can be run through the smartphone itself. The technology is Augmented Reality (AR). AR is technology that is the view of the physical world collaborated between reality and 3D virtual image, so the real world merges with the virtual environment [1]. AR is also used to combine objects 2D/3D from virtual word to the real word in real-time [2]. AR is not restricted only to the sight sense. It can be applied to all senses such as hearing and touch [3]. While mobile AR is based on augmented instructional media where some pages are marked so that it can display a three-dimensional models through web camera by integrating the applications that have been designed previously in cell phones or computers [4].

The tool to convey the message carried by the companies, institution, organizations, and intermediaries that aims to provide information is often referred sale. Information may include a description of the product, price and place, that is inform, entice, recalls to consumers, intermediaries, or a combination of both. A promotional mix supports some elements supporting the course of a promotion [5].

In other definition, promotion is the act of informing or reminding about product or brand specifications [6] so that promotion with AR is expected to improve the hits by showing product samples through 3-dimensional smartphone objects. Various studies have shown that AR can help product promotion.

Among the various researches that have been done, [7] has used AR for marketing. AR in marketing advertising has found a unique and interactive way to engage audience with the company brand. AR application as promotion tool also has been used to guide the tourists [8] – [9], and promote traditional Thai Folk musical instruments on Postcards [10]. In addition, [1] has also proven that AR can be applied to brochures to help promote the college.

AR technology does not completely replace reality, but AR only adds or complements reality [11]. Virtual objects incorporated into real environments serve to display information that is not acceptable to humans directly. This makes AR useful as a tool to help the user’s perception and interaction with the real world. There are three principles of AR, namely AR is a virtual and virtual world combine, AR runs interactively in real time and there is integration between objects in three dimensions, such as virtual objects integrated in the real world.

This study was conducted to show the benefits of AR for the promotion of smartphones more interesting and equipped with AR analysis as a promotion tool. The analysis of effectiveness is using Sign Test. Sign Test will be shown the effectiveness of AR as a promotion tool that is helping smartphone entrepreneurs in increasing sale.

2. The Research Method

To achieve the desired results, the study used two major stages, namely the stages of designing AR applications as a promotion tool and the stages of testing the effectiveness of AR as a promotion tool through a sign test.

The first stage is to design a questionnaire of AR application to measure its effectiveness as promotion tool. The following research flows by figure 1.

![Figure 1. The stages of questionnaire analysis](image)

The second stage in this research is designing AR application which has been adapted to the needs of promotion. The research flows that given by figure 2.
3. The Creation of AR Application

Implementation of the AR application begins with some activities.

Making Brochure Look

The brochure display is created using Photoshop which consists of brochure titles, smartphone images and smartphone markers.

The smartphone image created is as much as 6 types as shown in figure 3. The smartphone image is placed on the marker positioned on it. Marker as a place for Augmented Reality camera can scan images and project 3D smartphone model in accordance with existing smartphone image.

![Figure 3. Ready smartphone brochure](image)

**Image for Target Image**

The image created to be the target image, taken from the cropping of the six markers and aims for AR camera can scan images of smartphones to bring up 3D objects or AR. Next is to activate the target image that has been created to be read by the AR application is to upload the image in the target image to the database device provided by Vuforia by way of entry into the website [https://developer.vuforia.com](https://developer.vuforia.com).

**Insert Image Target to Software Unity 3D**

At this stage, all Image Targets are made into Unity Editor file by download. Target image files are imported into Unity 3D software by placing them into scenes.

![Figure 4. Import image target to software unity 3D](image)
background image smartphone becomes transparent.

Object Description
The final step of creating an AR application is the creation of each smartphone description by Photoshop. The description contains the name, specification and price of the smartphone. The ready description and in the form of an image file are included in the component plan in Unity 3D. The result is a board that displays the description of the smartphone as shown in the following 5 and 6 images.

![Image 1](image1.png)
Figure 5. Object description by photoshop

![Image 2](image2.png)
Figure 6. Layout results of marker, 3D object and description on unity 3D

4. Black Box Testing
After the AR application is successfully detected, then testing the program. A program test is performed to determine whether the system is running according to the procedures that have been designed. Application testing is by Black Box method where testing is done by observing the results of execution through test data and functional checking of the software.

Black Box testing is done on 3 things, namely AR application, Android operating system and testing against distance and angle AR to marker. This research uses marker with size 300 x 300 pixels. The following is shown Black Box test results for all forms of testing.

<table>
<thead>
<tr>
<th>Object Testing</th>
<th>Testing Detail</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>APK Installation</td>
<td>Whether it can be installed properly on android smartphones?</td>
<td>Success</td>
</tr>
<tr>
<td>Running Process</td>
<td>Is the application working properly and can be opened?</td>
<td>Success</td>
</tr>
<tr>
<td>Scanning</td>
<td>Is scanning done to marker?</td>
<td>Success</td>
</tr>
<tr>
<td>3D Model</td>
<td>Can the 3D model be seen backward?</td>
<td>Success</td>
</tr>
<tr>
<td>Description</td>
<td>Can the view of the description be enlarged/ minimized?</td>
<td>Success</td>
</tr>
<tr>
<td>Exit</td>
<td>Is the application coming out smoothly?</td>
<td>Success</td>
</tr>
</tbody>
</table>

Black Box testing in Table 1 show that the AR application was successfully tested on the prepared test object.

Further testing is done with three different Android app user versions as shown by Table 2. This is meant to prove that AR apps as mobile promotion tool can be used on different Android versions.

<table>
<thead>
<tr>
<th>Object Testing</th>
<th>Testing Detail</th>
<th>User 1 (Ice Cream Sandwich 4.0)</th>
<th>User 2 (Jellybean 4.1)</th>
<th>User 3 (Lollipop 5.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>APK Installation</td>
<td>Whether it can be installed properly on android smartphones?</td>
<td>Success</td>
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<td>Success</td>
</tr>
</tbody>
</table>

Black box testing is also done at the distance and angle of AR to its marker. It aims to determine the right size for AR to look clear and more real.
The questionnaire filled with the number 1 means that the respondent answered “Yes” in each question. While the number 2 means who answered “No”. Then the data is processed using sign test method and calculated by SPSS application.

The fault tolerance specified in the test is 5% or 0.05. The calculation results are divided into 2 areas. There are not significant area and significant area. Because the fault tolerance is smaller than the significant area, it can be said that the application of AR is quite effective to serve as a smartphone promotion tool. The result of sign test is shown by Table 5.

This study gives hope that using AR as promotion tool will be able to increase cell phone sales of smartphone entrepreneurs in Marpoyan Damai.
6. Conclusion

This study shows that the use of Augmented Reality application as a promotion tool is very helpful for smartphone entrepreneurs in marketing their products. This research is different. In addition to making AR applications are also measured against the effectiveness of it. This can help increase the interest of potential buyers of smartphones as it is helped with promotions that can be seen anytime and anywhere. Potential buyers are pampered with attractive, informative 3-D service. It is expected that AR applications can be tested on all android versions and the effectiveness of AR as a promotion tool can use a wider sample to get more objective assessment.

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8. References


