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Application of Augmented Reality Technology in E-Commerce Web Applications

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Abstract

Augmented Reality (AR), is a technology that uses the concept of combining real reality with virtual reality in real time. Augmented Reality is not the same as virtual reality capable of replacing real-world reality, but it is useful for adding or supplementing. With a 3-dimensional object inserted in the target object marker which is a special image or pattern which has been inserted by 3D image, it can be detected by the application and display a 3-dimensional image in real-time. Android smartphones can allow for AR development that can be accessed by many users and it is very easy to use. AR can be used to display products in 3 dimensions on websites of e-commerce. Augmented Reality can be used to make it easier for buyers to interact directly with products in a real way in the virtual world. The method used to design the CV.Sukses Group website was to use the MDLC (Multimedia Development Life Cycle) method which consisted of concept, design, material collecting, assembly, testing, and distribution. The results of this research were in the form of e-commerce websites, AR applications, and 3-dimensional objects. The purpose of this final project was to develop an Augmented Reality application aimed at buyers who wanted to interact directly with CV.Sukses Group products. This application was created with Unity and Vuforia Engine as AR application development tools. For websites built using a WordPress CMS. The application of Augmented Reality-based technology on the CV.Sukses Group e-commerce website could read markers on product images that would display 3-dimensional models on the screen of android devices in real-time.

Keywords: *Augmented Reality, Android, E-commerce, 3D Modelling.*

1. Introduction

Along with the development of increasingly advanced technology due to changes in the mindset of humans, who are increasingly developing to continue to improve technological progress. During this pandemic, we know that the economic number of UMKM in Indonesia has decreased, and there are lots of shops that are closed due to the COVID-19 pandemic, which limits people from leaving the house and keeping their distance. For this reason, many UMKMs rely on direct sales or traditional methods, and now to maintain their businesses, many UMKMs have switched to online stores because the scope of the market through online media is very large, reaching all corners of the country. Online shopping has become a trend for people from all walks of life. The convenience offered to customers makes online shopping more and more popular. Due to the high public interest in shopping online, competition in this sector is getting tougher. One of the innovations that will be carried out by e-commerce companies is to focus on the development of the customer experience and the application of augmented reality by displaying three-dimensional objects on products. With this being able to provide a different experience when browsing e-commerce websites, this can be an attraction to customers who want to buy products sold by e-commerce companies. This results in a CV. Sukses Group takes preventive steps to create a website with the application of augmented reality (AR) technology on the CV. Sukses Group e-commerce website. A static web is one with one-way information that comes only from the author or owner of

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the web code [1]. However, after PHP was first released and shown to the world in 1994 by Rasmus Lerdorf, users of static websites switched to dynamic websites. Perfecto coffee and tea are original products from Indonesia. Perfecto coffee and tea are produced directly by farmers in Indonesia, who are the movers and guardians of Indonesian human intellect. There are various types of coffee that we often encounter, such as Robusta coffee, Sanger coffee, and Arabica coffee. No wonder there are so many people who like coffee and tea, young and old alike. For this reason, Perfecto creates and produces coffee and tea that are made from selected coffee beans and tea leaves so that connoisseurs feel satisfied with the taste obtained from Perfecto products.

At the time of writing, the CV. Sukses Group's website is not particularly interesting or responsive, limiting its ability to operate efficiently. As a result, a new website that is both interesting and responsive is required to create a better user experience for potential buyers. The implementation of Augmented Reality on a website can provide a better shopping experience for customers when selecting products because of the products that are distributed on the website CV. Sukses Group can be seen clearly by the distinction between real and imagined reality.

In building a website using a CMS (Content Management System), where users do not need to use a complex programming language to change themes or add products to the website, it is highly recommended for beginners who want to create an attractive and unique web design to present products from Perfecto. With the increasing needs of the community for information, the providers and developers of information technology continue to develop the latest products in the type of software that makes users able to use them as easily as possible [2]. The CMS used for the website is WordPress where features include detailed product photos, and descriptions, and are added to the development of AR (Augmented Reality) technology, by adding AR to every image of Perfecto products.

2. Research Methodology

2.1. Data Collection

Specifically, research was conducted by studying books, magazines, and other written works related to the writing of this thesis. From this research method, information, definitions, and several application design methods will be obtained. The author draws on a variety of manuals as sources for this thesis. This is intended to get an understanding of several definitions related to the writing of this final project.

2.2. System Development Method

MDLC is a method consisting of Concept, Design, Material Collecting, Assembly, Testing, Distribution[3]. In developing multimedia using MDLC based on the UML system and the application of Augmented Reality technology that displays 3-dimensional objects in real reality Development is a research method used to produce certain products and test the effectiveness of these products [4].

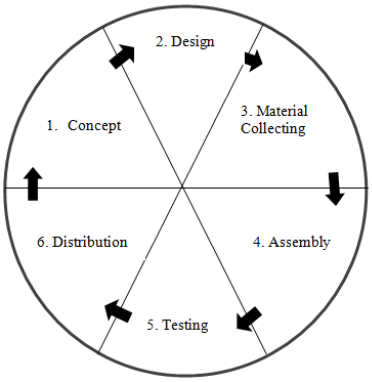

Figure 1. *Step of MDLC*

a) Concept

During the conceptualization stage, the goals, subject, and product concepts are defined and designed. The intended subject of this development is to be able to display e-commerce websites and display Augmented reality on product images. The goal of multimedia development is to display 3-dimensional objects that appear in real reality. All elements are then compiled on the website.

b) Design

During the design stage, the author makes a product design based on the product development concept that has been determined in the previous stage. This stage allows the author to design a website interface and add 3-dimensional objects that are displayed in each product view, which is a combination of real reality and virtual reality.

c) Material Collecting

The next stage is the collection of materials. This stage allows the author to collect some of the materials needed to develop multimedia. At this stage, the author collects images used for products and company logos and makes 3D models that are used to create 3D objects, domains, hosting, and supporting software.

d) Assembly

After the materials needed are collected, proceed with making a website. Multimedia development in this study utilizes Blender 3D 2020. Meanwhile, for creating websites and applications using Wordpress and Unity, According to Subhashini et al. (2020), Blender is a 3D computer graphics software product that is open source and free and is used to create animated films, visual effects, interactive 3D applications, or computer games [5].

e) Testing

The next stage is testing. The testing phase aims to identify the feasibility of the application program and website being developed. It also aims to test the media on the intended subject to identify how accessible it is. At this point, black box testing is used on websites and applications. Black Box testing aims to find out whether all functions on the website can function properly or not, as well as whether AR applications can function properly and can identify markers to display 3D objects. Marker-based AR requirements are used to identify appropriate markers so that the required information can be presented [6].

f) Distribution

After the designed website and application have passed the testing stage, the website and application have been determined to be suitable for normal use.

2.3. Analysis System

This system analysis aims to find out what the software and hardware requirements are for the web application you want to design. By analyzing the web application system, it is possible to identify problems with the advantages and disadvantages of an application, including an analysis of system specifications, user specifications, and the operating environment.

CV. Sukses Group is a company engaged in the field of coffee and tea. But also exports various commodities and products from Indonesia, such as areca nut, coconut, cashew, instant noodles, crackers, etc. Has a website at www.yantyfaradillah.com, and according to the company name www.suksesgroup57.com has been developed with various advantages, namely the application of Augmented Reality technology that can attract the attention of prospective buyers because prospective buyers can see products in real-time and it a combination it of the real and its virtual worlds, There are also several

additional features such as add to cart, cart, tracking orders, and others that support the e-commerce system at CV. Sukses Group.

The results of this system design are very useful for CV. Sukses Group in promoting products because the application of Augmented Reality is still very rarely used by most e-commerce in Indonesia. There are products that are self-produced by CV. Sukses Group, namely:

1) Coffee (Green Beans/Roasted/Ground)

a) Coffee Durian
b) Coffee Arabica Papua
c) Coffee Arabica Java
d) Coffee Arabica Toraja
e) Coffee Arabica Aceh Gayo
f) Coffee Arabica Bali Kintamani
g) Coffee Robusta Sidikalang
h) Coffee Instant Sanger 3in1
i) Organic Brown Coconut Sugar
j) Coffee Arabica Luwak Liar

2) Tea (Black Tea and Green Tea)

a) Green Tea
b) Black Tea

3. Result and Discussion

3.1. System Implementation

System Implementation is the stage where implementation and, at the same time, testing are done for the system that has been designed based on the results of the analysis and the results of the design that has been completed. The purpose of implementation is to confirm the design program module and implement the promotion system [7]. To use a system that has been designed, a supporting device is needed to run the system such as a computer that has certain specifications that support the running of the system. The system is designed for CV. Sukses Group is an e-commerce website application that applies Augmented Reality technology to products distributed by CV. Group Success. Other views are provided, such as an educational blog page which is very useful as a source of business knowledge for every web visitor who is interested in starting a business. There is also a shop page, and a gallery containing photos and video documentation of CV. Sukses Group, and others.

a) Dashboard View

The Dashboard view is the initial appearance on the website the first time the website is accessed by new users or by users who have registered on the CV.SuksesGroup website. The dashboard view can be seen in Figure 2.

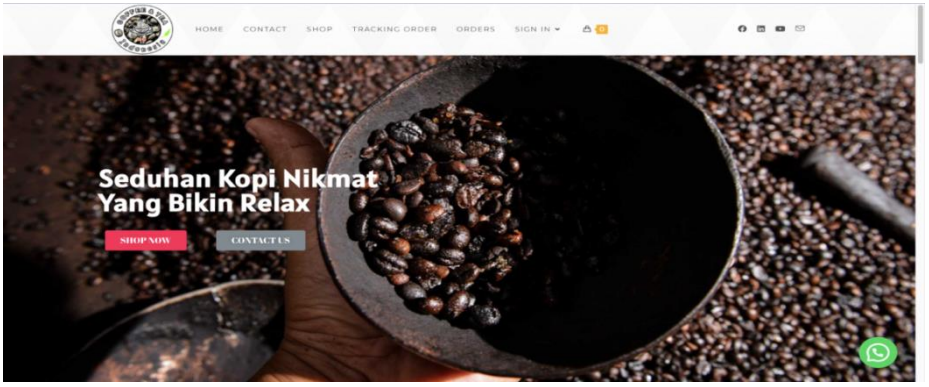

Figure 2. Dashboard View

b) Login Page View

Before accessing more and buying products from CV. Sukses Group, users are required to log in. The login page is specifically designed for Administrator and User access. If the user has already registered, the user can directly enter username or email and password data into the login form and press the login button. If the username and password are incorrect, then it will not enter the profile page, but if the username and password are correct, it will immediately enter the profile page. The dashboard display can be seen in Figure 3.

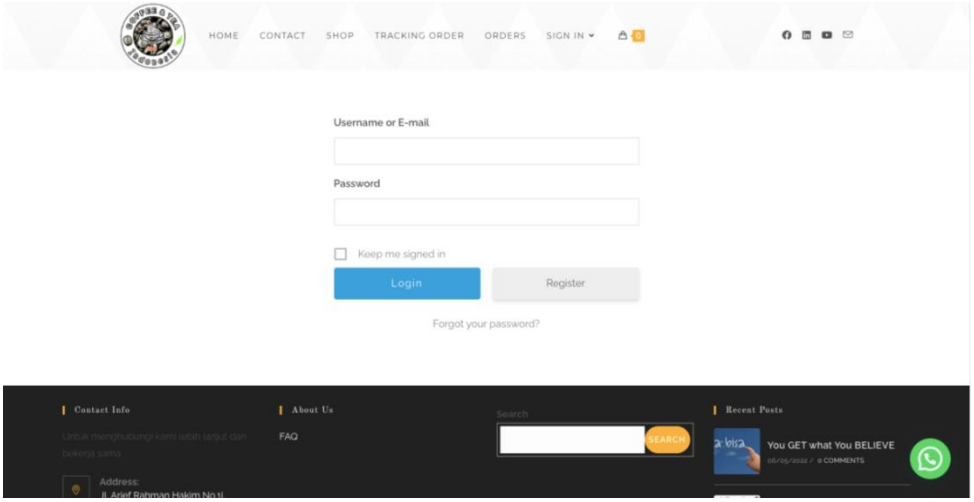

Figure 3. Login page view

c) Register Page View

If you have not registered, you will not be able to access anything on the CV.SuksesGroup website, therefore, you need to fill in the registration form correctly and enter a strong password, such as a combination of letters, numbers, and symbols. If it is not appropriate, then the registration process will be hampered. The display register can be seen in Figure 4.

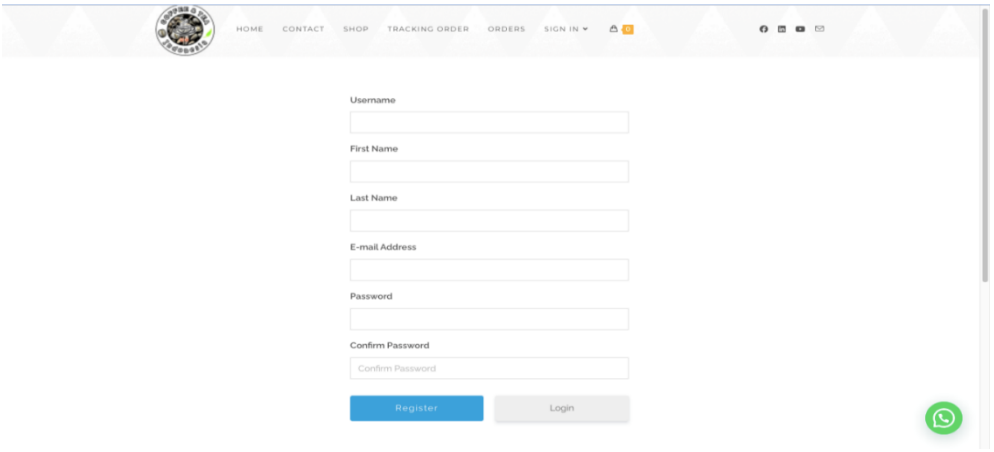

Figure 4. Register Page View

d) Profile Page View

Profile views will appear upon successful login. In the profile view, you can change your name, password, and email, you can also delete an account. If you want to change your profile photo and cover, you can click the "view profiles" button. The profile view can be seen in figures 5 and 6.

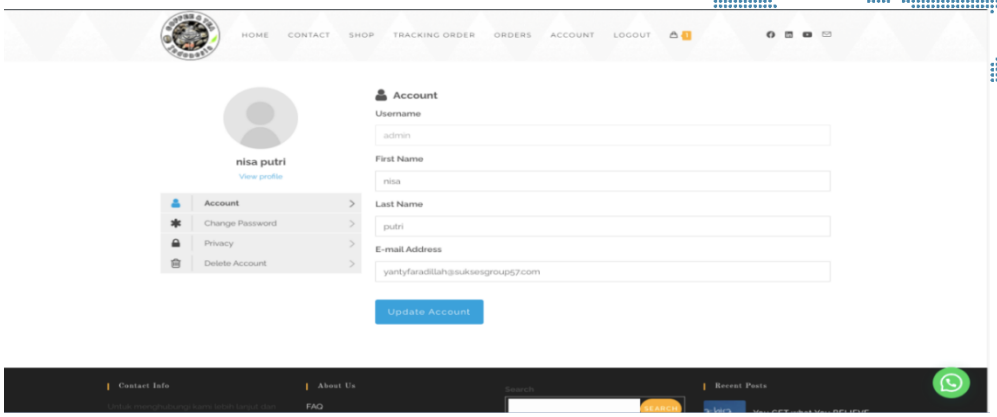

Figure 5. Profile Page View

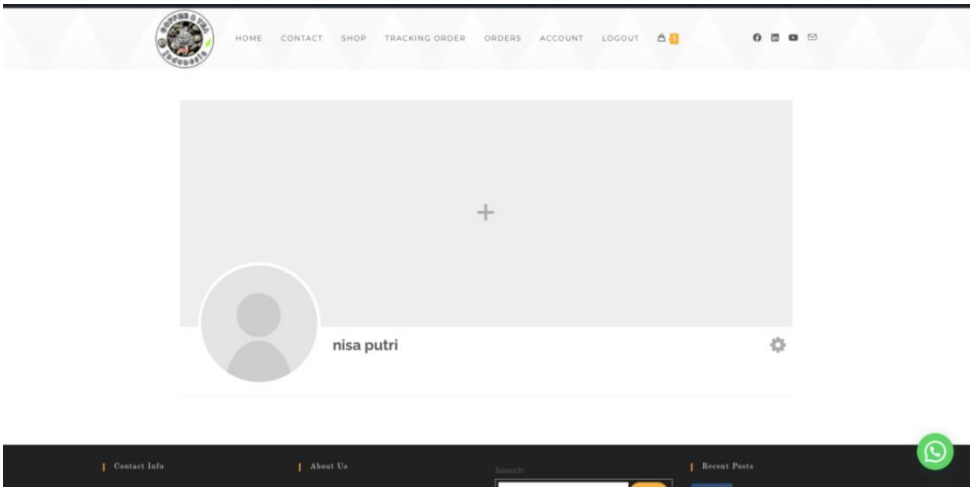

Figure 6. Profile Page View

e) Shop Page View

If the user wants to buy a product that is distributed by CV.SuksesGroup, then he can select the shop page in the header listed. Inside the shop page, there are pictures, descriptions, prices, buyer comments, and buyer ratings of those who have already purchased the item, and there are also categories you want to search for. shop display can be seen in figure 7.

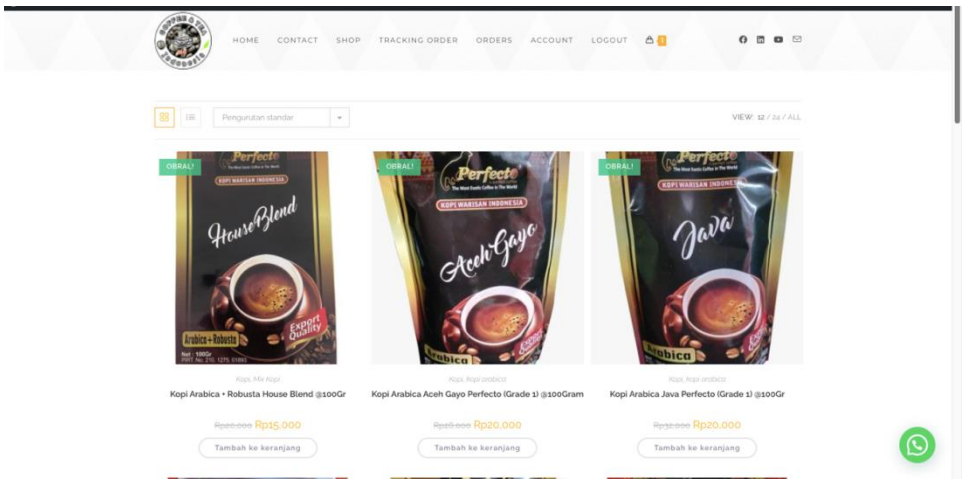

Figure 7. Shop Page View

To see a product in detail, click the photo section of the product you want to see so that it displays a product description, product photos that can be zoomed in and out, product prices, product comments, and ratings, and also Augmented Reality on the product can be seen at figure 8.

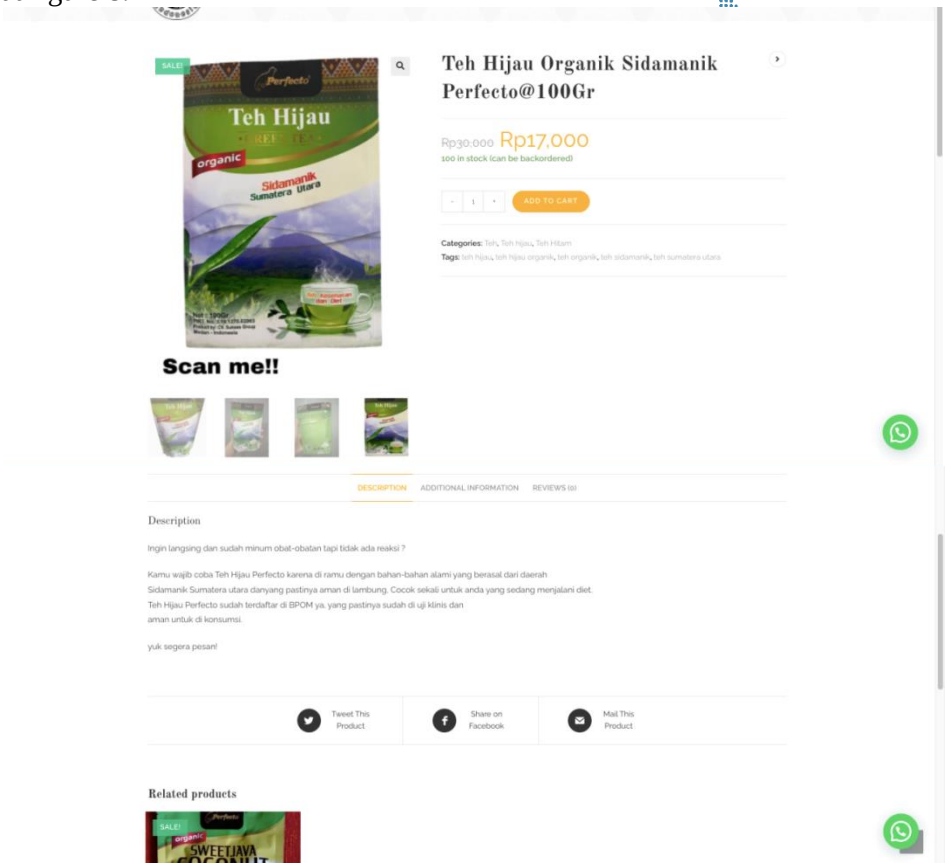

Figure 8. viewing the product description

It is on this page that the application of Augmented Reality is used, to display 3D holograms on products, You can scan products with the application provided by CV. Sukses Group to display 3D Holograms and after installation, scan the part of the photo marked with the words "SCAN ME". Can be seen in figures 9 and 10.

Figure 9. Marker on Green Tea products

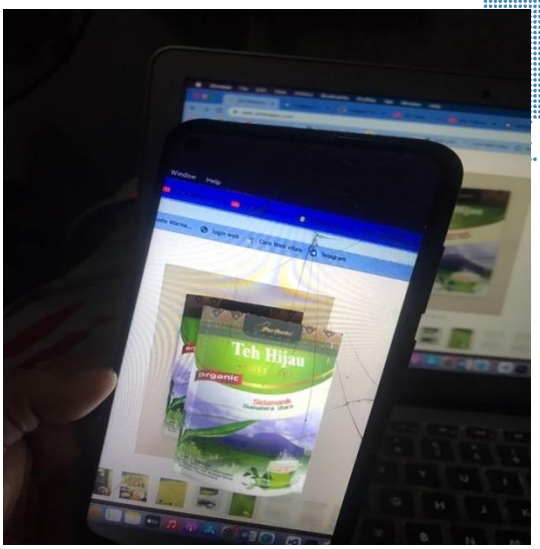

Figure 10. Holograms of Products

f) Cart Page View

On the Cart Page, you can see what products you have selected. If you have a shopping coupon that is good for a discounted price, you can enter it in the coupon column listed at the bottom of the cart. The cart display can be seen in figure 11.

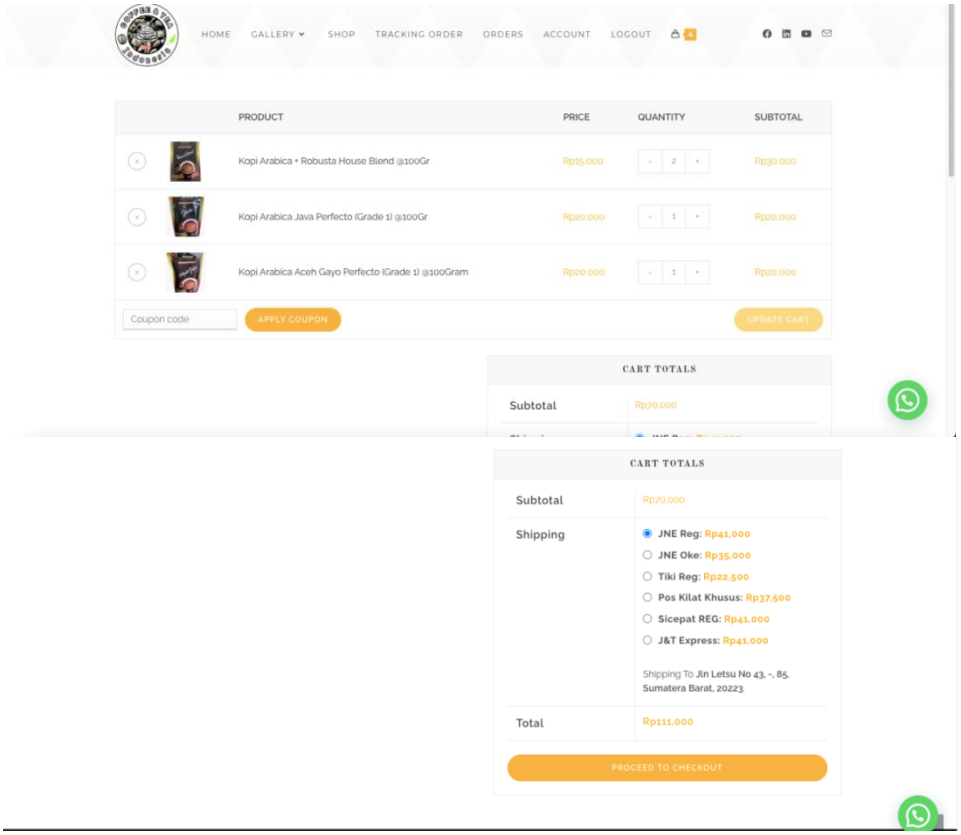

Figure 11. Cart Page View

g) Checkout Page View

The checkout page is a page that displays the total amount of all the products you purchased and also includes shipping costs that have been totaled. The checkout display can be seen in Figure 12.

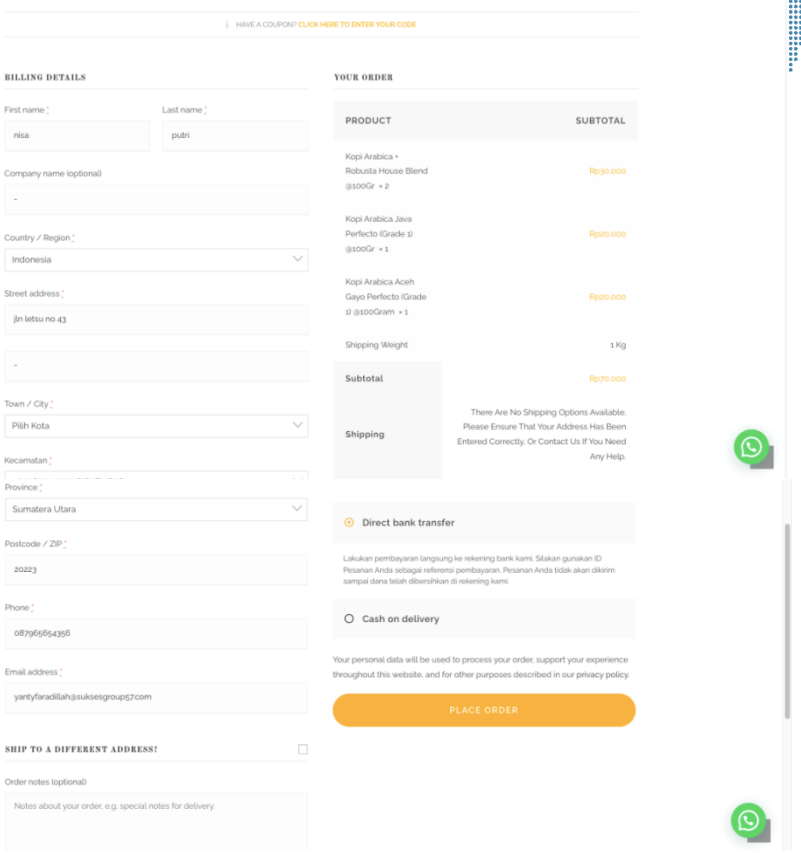

Figure 12. Checkout Page View

h) Tracking Order Page View

If you have already checked out, you can check the status of your product by entering the order code and email that you input when checking out the product in the form provided on the Tracking Order page. Display Tracking Order can be seen in figure 3.12.

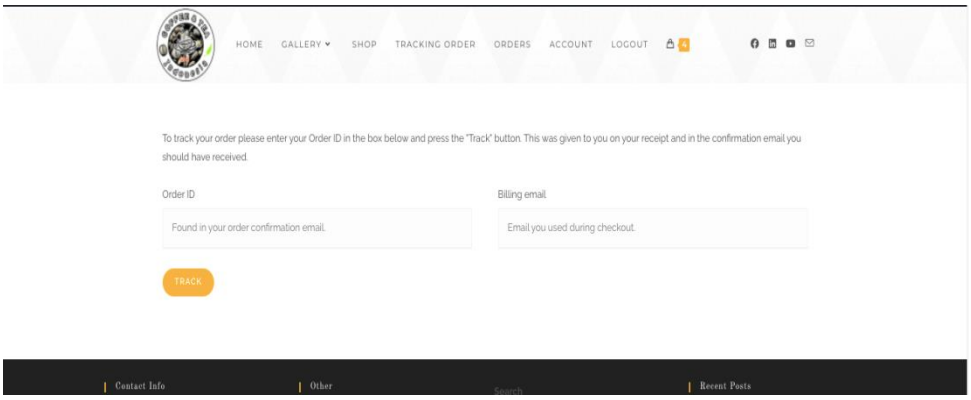

Figure 13. Tracking Order Page View

i) Tampilan *Gallery*

To view photos and video documentation of activities from CV. Sukses Group you can choose the gallery option in the header section of the product. The gallery display can be seen in figures 14 and 15.

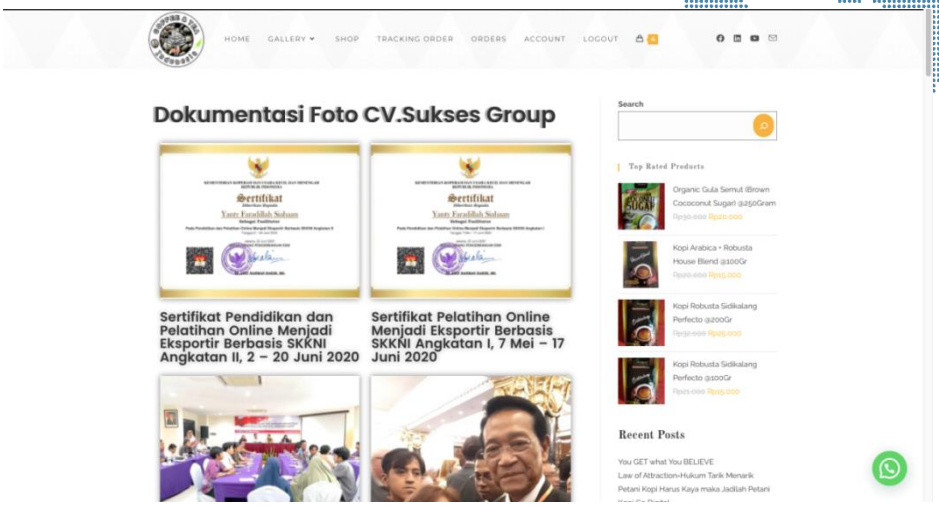

Figure 14. Documentation Images

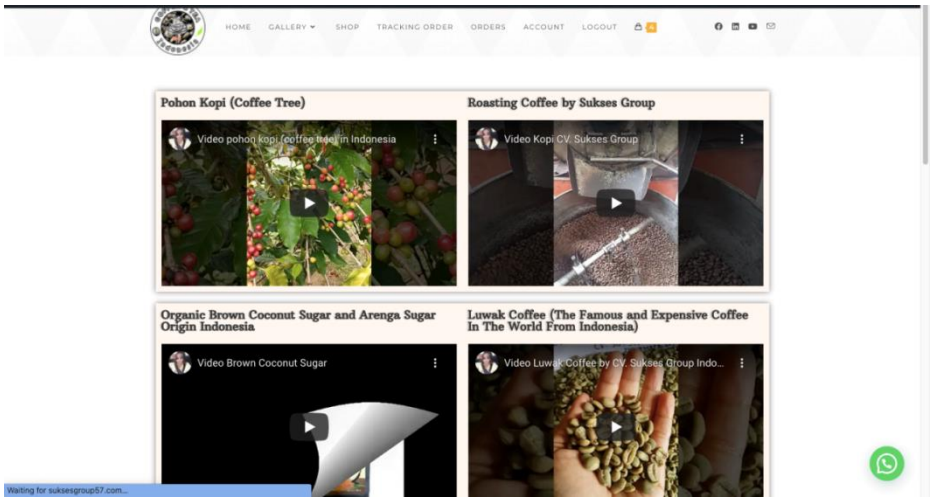

Figure 15. Documentation Video

j) Blog for Business Education Presentation

The appearance of Business Education Blog displays various kinds of articles that explain business according to CV.SuksesGroup. The appearance of the Business Education Blog can be seen in figure 16.

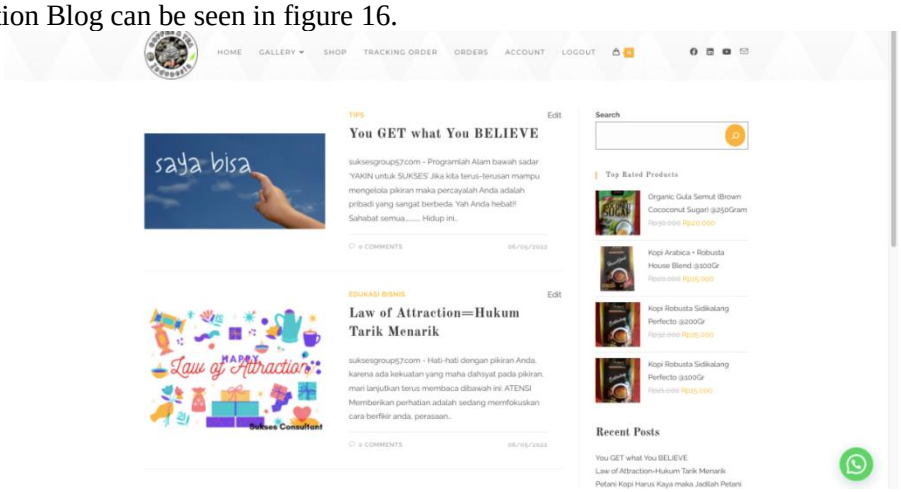

Figure 16. Blog Business Education

k) About Page View

The About view displays the history of the formation of CV. Sukses Group, starting from scratch. The About display can be seen in Figure 17.

Figure 17. About Page View

l) FAQ Page View

The FAQ display, which stands for (For Answer Question) is all questions that are frequently asked by every consumer who wants to buy a product or knows about a product. Display FAQ can be seen in Figure 18.

Figure 18. FAQ Page View

m) Contact Us Page View

The Contact Us view displays all contacts that can be contacted by users to get closer to CV. Sukses Group, both for business and personal purposes. The Contact Us display can be seen in Figure 19.

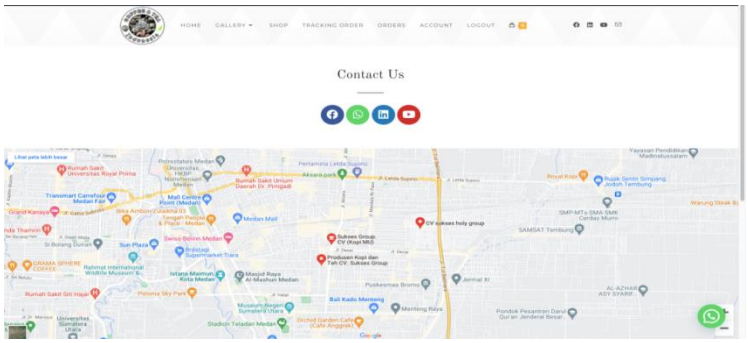

Figure 19. Tampilan *Contact Us*

3.2. Discussion

The application of the existing MDLC method on websites and applications, namely :

a) *Concept*: The concept in this application uses the concept of Augmented reality which is applied in a two-dimensional product image with the "Perfecto AR" application.
b) *Design*: Design the appearance of the application, changing product images and logos using Canva, designing 3D images using Blender 3D, designing websites using WordPress, and designing Use Cases and Activity Diagrams using Lucid Charts.
c) *Material Collection*: Applications and websites that are designed require several components to assist the application and website development process, namely, 2D and 3D images, logo and product images, hosting, domains, and supporting software.
d) *Assembly*: The components that have been collected are designed to become a website and application.
e) *Testing*: To carry out website and application feasibility testing, namely by using Black box testing.
f) *Distribution*: Applications and websites that have passed testing have the right to be distributed to the public.

3.3. Website Testing Results

The tests carried out in this study used Black Box Testing which tested one by one the functions of everything on the CV. Sukses Group website. Black Box Testing is a system testing technique that aims to find out whether the application still has problems or not, whether the buttons contained in the application function or not, or whether they are already running as desired. Group Success[8].

Tabel 1. Testing Blackbox

No	Testing	Test Case	Expected results	Test result	Conclusion
Header					
1	Go to Home page	Click the Home button on the Header	Display dashboard page	As expected	Valid
2	Go to the Shop page	Double-click the Shop button on the Header	The shop page opens.	As expected	Valid
3	Go to the Orders page	Click the dropdown on Shop then click Order	Order page is opened	As expected	Valid
4	Go to Cart page	Click the dropdown on Shop then click Cart	Cart page is opened	As expected	Valid
5	Go to the Tracking Your Order page	Click the dropdown on Shop then click Tracking your Order	Tracking Your Order page is opened	As expected	Valid
6	Go to the Register page	Click the Sign In button on the Header	Register page is opened	As expected	Valid
7	Go to the Account page	Double-click the Account button in the Header	Account page is opened	As expected	Valid
8	Go to the Login page	Click the dropdown on Sign In then click Login	Login page is opened	As expected	Valid
9	Go to the Logout page	Click the dropdown on Sign In then click Logout	*Logout* page is opened	As expected	Valid
Halaman *Contact Us*					
10	Go to Whatsapp Page	Click the Whatsapp Icon on the Contact Us page	Whatsapp page is opened	As expected	Valid
11	Go to the Facebook Page	Click the Facebook Icon on the Contact Us page	Facebook page is opened	As expected	Valid
12	Go to Youtube	Click the Youtube Icon on the Contact Us page	Youtube page is opened	As expected	Valid

	Page				
13	Go to LinkedIn page	Click the linkedln icon on the Contact Us page	Linkedln page is opened	As expected	Valid
14	See Company Location	Click Maps on the Contact Us page	*Google Maps* page is opened	As expected	Valid
Halaman Shop					
15	Enter the product to the add to cart waitlist	Click the add to cart button on the Shop page	Product added to Cart	As expected	Valid
16	Go to the product page	Klik Tombol *add to cart* di dalam halaman *Shop*	View product pages	As expected	Valid
17	Displays an AR 3D hologram	Scan the product image	Generates a holographic AR image.	As expected	Valid
18	Go to Cart page	Klik Tombol *add to cart* di dalam halaman *Shop*	Product added to Cart	As expected	Valid
19	Go to the Checkout Page by clicking the Process to checkout button	Click the Process to checkout button on the page	Checkout page is opened	As expected	valid
20	Find out the price list of postage	Fill out the form provided with the full address	Displays a price list of postage	As expected	valid
Footer					
21	Search through the search text box	Fill in the text box that you want to search for then click the “Search” button	Shows what you're looking for If it is not on the CV. Sukses Group website, then what you are looking for will not appear.	As expected	valid
22	Go to the FAQ Page	Click the FAQ button in the Footer section	FAQ page is opened	As expected	valid
23	Go to the About Us page	Click the About Us button in the Footer section	About Us page is opened	As expected	valid
Aplikasi AR					
24	Open Application	Click Application	Enter the application view	As expected	Valid
25	Enter the AR camera	Click start on the main view of the application	Enter the AR camera	As expected	Valid
26	Displays 3D Objects	Scan an image marked "Scan Me"	Displaying 3D Objects	As expected	Valid

4. Conclusion

Based on the results of the research described in the previous chapters, the authors can draw the following AR applications are designed using Unity while creating AR markers uses the Vuforia Engine. 3-dimensional objects for AR are designed using Blender 3D Software to design 2-dimensional images used for markers using the Canva Application so as to create a good User Experience by applying the AR concept to every product available on the website. This website is designed using Wordpress CMS, so it does not require complex programming and has used search engine optimization and backlinks to social media. Website and application development can be done if you get login permission to become an administrator, and applications are closed source.

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