

F3-INTERIOR E-COMMERCE APPLICATION USING 3D VIEW WEBGL REACT THREE FIBER BASED ON ANDROID

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Abstract: The development of technology in this era is growing rapidly and has a big effect on the wearer, especially in the world of business. Buying and selling interior furniture manufacturing services is still fairly manual. With the development of information technology, the introduction of interior and exterior furniture can be done using a smartphone or personal computer. People sometimes still experience problems in choosing the right furniture and texture choices. The previous online buying and selling system also lacked the desired texture or color selection, so that orders were still fairly rigid and did not match the wishes of consumers. Based on these problems, this research created an application that can assist consumers in exploring the desired furniture, from setting the color and texture atmosphere. By using WebGL (Web Graphic Library) which makes it easier for consumers to see an overview of interior furniture in the form of a 3D (Three Dimensional) view. but WebGL itself can only be displayed via the website, so the author here will use packages that help React Three Fiber which can render WebGL on Android. The results of this study produce the output of an application that displays 3D on furniture items, which can also change the material texture or color in real-time (real).

Keywords: E-Commerce; 3d View; Interiors furniture; WebGL; react three Fiber

INTRODUCTION

In actuality, technological advancement is a consequence and risk of the times, which cannot be avoided and must be surmounted. In this case, the world is progressively becoming quicker and more digital, and this requires us to be sensitive to ongoing changes. Undoubtedly, in the current era, numerous lines are undergoing various mental and behavioural shifts in order to be in step with technological advancements (Sinaga & Samsudin, 2021). The evolution of smartphones in the modern era has produced not only a communication device, but also a device with additional functions. As is the case with entertainment media, learning media, and business media such as markets, as well as the ability to create a new system that can be utilised on any platform (Samsudin et al., 2019).

Ordering products from F3-Interior is problematic for individuals who are still somewhat manual. If ordering interior products is limited to selecting a model or colour in a single form, it is very difficult for individuals with different preferences. Not only do people have to find a repair near to their home to make ordering and communication simpler, but they will also want to customise many aspects to their individual preferences (Qadriyanto et al., 2018). The selection of wood-based materials is a consideration for the public in ordering interior or furniture products. Not only that, the designer or maker of these interior products must make predictions of estimated costs to provide information to buyers or consumers. Then consumers have to imagine how the desired design color and texture.

Based on observations made through interviews with F3-Interior proprietors, they require a system to assist consumers in purchasing interior products; specifically, they require an E-Commerce system to facilitate the procurement of interior products. E-Commerce plays a significant role in the transformation of buying and selling activities between consumers and vendors by reducing operational costs and enhancing the effectiveness of a purchasing and selling activity that enables a company to market its products. Seeing this fact, the application of E-Commerce technology is one of the most crucial factors in terms of supporting the success of a product from an existing corporation.

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In this instance, the E-Commerce system support that is developed will use 3D View as a convenience for consumers or customers to observe the interior product they desire in terms of colour, shape, and texture. To solve the problem of creating his own 3D View in Android, the author will implement the React Three Fibre component as a 3D View generator that is reactive (react).

F3-Interior is a micro, small, and medium-sized enterprise that sells interior or furniture products. The F3-Interior company was founded in 2019, at which time it only issued small furniture products such as shoe racks, clothes, etc. In 2020, however, F3-Interior began issuing relatively large interior products such as interior cabinets for specific rooms, chairs, room interiors, etc. F3-Interior is physically located in Aceh, Takengon, Simpang 76. F3-Interior frequently has difficulty estimating estimated costs and it takes time to provide a prototype design to customers or consumers.

Based on the aforementioned issues, researchers are interested in developing an E-Commerce application system that can aid in the simplification of the interior ordering process by providing a three-dimensional customization system for interior furniture objects. So that it is simple for consumers to order and estimate the cost of their desired interior furnishings (Wiranda, 2021).

The previous research that the author examined before conducting further research was the work of (Qadriyanto et al., 2018) entitled "Design and Build 3D Visualization Applications for Home Interior Furniture Using Augmented Reality with the Android-Based Markeless Method." matching the harmony of furniture with surrounding objects using Augmented Reality (AR), the drawback in this study is the lack of a customization system for changing variations of furniture items so consumers have to follow existing 3D object references.

Then there is also from (Ismawari et al., 2020) regarding "Design and Build Web and Android-Based Ordering and Sales Applications in YT.Wall Interior Stores" in this study ordering wallpaper for the walls of a house or room can be done from the web and Android but the drawback is not there is a preview or customization using 3D View so consumers can still feel or use imagination to match the wall of the house or room they want.

There is also research from (Fahmi & Fatdha, 2016) regarding "Three-Dimensional (3D) Library Applications Using WebGL Technology". In this study, 3D WebGL was used as a support for interaction in the E-Library so that users or users who interact with the E-Library do not seem monotonous. However, the drawback of this research is that it still uses webview so there is still a lack of access to mobile or smartphones.

Based on the three previous studies that have been described, it can be concluded that the E-Commerce ordering system for interior furniture products is still relatively difficult for consumers to use. lack of comfort in using the application, so the author wants to build an interior furniture e-commerce system using 3D view to make it easier to customize by using react native and react three fiber in developing this application.

LITERATURE REVIEW

furniture

Furniture is a material or object that has its own function for the household. as for several functions for furniture, namely chairs used as seats, tables as bases for activities; work, write and so on, a cupboard that serves as a storage area. With furniture, humans can be helped in all their activities in terms of home interiors by adjusting the style of each room.

E-Commerce

E-Commerce is an online buying and selling system, where buyers do not need to always come to a store or company to buy products, E-Commerce is an alternative choice for a company that is especially engaged in the entrepreneurial field as an information medium, which makes it easy for interaction between sellers and buyers without being limited by space and time. Supported by the development of information technology that is increasingly sophisticated and easy to obtain (Gunawan et al., 2018).

Three Dimensional Drawing

Commonly referred to as 3D, 3-dimensional computer graphics or 3-dimensional images are the shapes of objects that are long, wide, and tall. Chart 3 Dimensions is a technique depiction based on point coordinate axes x (flat), y (vertical), and z (skewed). Representation of three-dimensional data as a result of processing and application of light effects to two-dimensional (2D) computer graphics. Three dimensions, typically employed in graphic design.

WebGL (Web Graphic Library)

In 2007, Vladimir Vukicevic, a software engineer, introduced WebGL. In 2009, WebGL became a web standard that the Khronos Group began developing with Opera, and Google (Chrome), Mozilla (Firefox), Apple (Safari), and other 3D developers began to adopt it. WebGL employs a client-based rendering technique in which the elements of a 3D scene are typically downloaded from the server, but all image processing is performed locally using the client's graphics hardware (Fahmi & Fatdha, 2016).

Laravel

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Laravel is a free and open source PHP web framework created by Taylor Otwell that can be used to develop MVC (Model-View-Controller) web applications (Somya & Nathanael, 2019). Laravel has modules that can be managed and introduced with various methods for accessing relational data from databases, as well as utilities that facilitate the maintenance of applications (Kurniawan et al., 2019).

ReactNative

React Native is a JavaScript framework used to build Android and iOS mobile applications. React Native has the foundation of React and javascript libraries in building interfaces. React Native is written with a mix of javascript and JSX. (Nursaid et al., 2020). React Native is a JavaScript framework for writing rendering native and mobile apps for iOS and Android. It is based on React, Facebook's JavaScript library for building user interfaces, but instead of targeting browsers, it targets mobile platforms (Fitria Sri Budi Asih, 2022).

React Three Fiber

React Three Fibre or React Fibre is a sophisticated Three.js renderer that helps render models and animations in three-dimensional space. For the defaults of react and application. React three Fibre is a version of threeJs developed by React for use with ReactJs and React Native. It's declarative, component-independent, interactive, and able to utilise the ecosystem ReactJs.

GLTF (GL Transmission Format)

Khronos Group's GLTF is a format for efficiently transporting and importing 3D scenes and models. Primarily, the GLTF file format comprises three modules: Model files (.gltf /.glb) containing descriptive data such as node hierarchy, cameras, mesh, materials, etc. This is also considered to be the text of files. .son files containing data for geometry, animation data, and other structures. Map data files (.png/.jpg) that contain texture information. The GLTF file format can reduce rendering-independent information in 3D model files and has a superior file compression effect, making it more suited for Web-based loading.

METHOD

Development Method

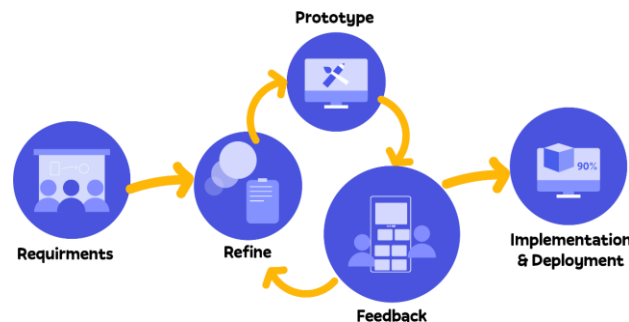


Figure 1. RAD Development Method

The development method in building the system that the author built is to use the RAD (Rapid Application Development) method. The workings of this method will involve system users during system development. In the prototype phase itself, the developer will design the system by following the features needed by the system (Andriani & Qurniati, 2018). After that, the developer will conduct a review with system users. Another advantage of RAD itself is that it can shorten system development so that the processing time needed can be more efficient.

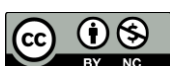
Design

At this stage the planning for application development will run on mobile. In this case, the author will use the react native framework from react.js as a mobile development framework, then combine it with react three fiber or react three as WebGL or 3D view to support consumer needs in changing the texture or color on each surface.

Design

At this stage, application developers will focus on the design of the system to be built, such as flowcharts and UI (User Interface) and UX (User Experience). In this case the author will make several diagrams as a flow plan or rough description of the system. Diagrams made by authors or developers include DFD (Data Flow Diagrams) and UML (Unified Modeling Language) (Husein et al., 2022; Rahayu & Husein, 2023). This stage will produce an abstract picture of the flow of the system being built, which can answer the problems from the previous stages of the process (Harjanta & Herlambang, 2018).

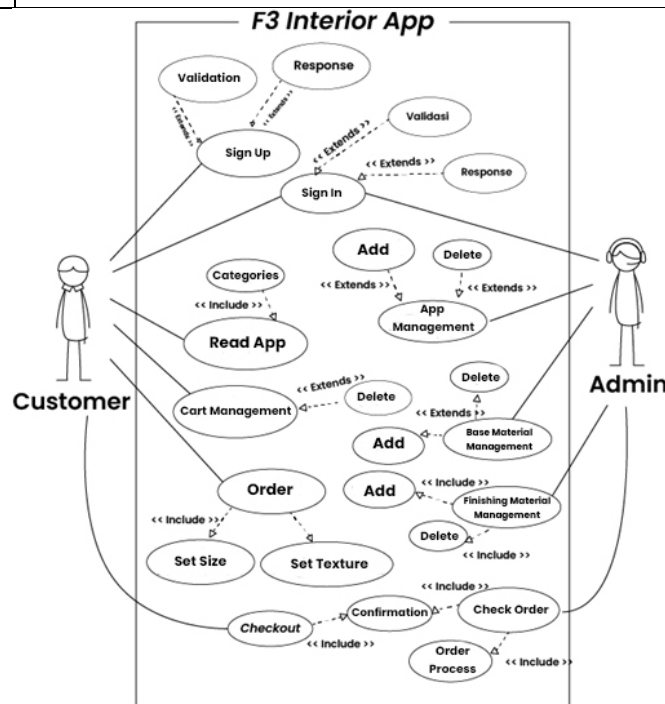
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Use case Diagram Booking furniture Interiors

Picture under is use case booking furniture interiors F3 Interiors, as for the explanation asfollowing;

| | | |
|----------------------|---|--|
| Customer | : | person Which can order or access data goods until data order Which hasincluding ordering A goods furniture Which He buy. |
| Admin | : | person Which will manage data - data category, users, goods, category, texture material and includes viewing |
| Login/Register | : | is step First on moment open system If Not yet do login or enteraccount Which Already registered previously. However if Already login then customer will go straight to to pagehome. |
| View Products | : | something Where customer will see goods Which want in message |
| Booking | : | a customer activity where he will place an order for interior furniture wanted Where functionality including customization material And texture including type wood Which wanted. |
| Order Confirmation | : | is a customer activity in making payments to from surveys, dp payment, up to to total. |
| Product Management | : | something activity for admin in manage items furniture including functionality addition data, edit And also delete. |
| Materials Management | : | an admin activity in managing material data including additions |
| Texture Management | : | something activity admin in manage data material including addition data, editand delete. |
| Check Orders | : | is an activity where the admin will see and change the order status or the payment done by customer. |



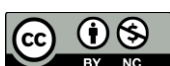
Picture 2. Use case Furniture Ordering Diagram Interiors

Sequences Ordering Diagram Goods furniture

The image below is a Sequence Diagram for ordering interior F3 Interior furniture, as for the explanation Namely as follows;

Login : The customer will go through the login stage when the system is opened. When the customer enters account, then from behind the scenes it will send token user data as an initialization of whether the customer has logged in before or not. If the user token exists, the system will deliver it to the page dashboards or home.

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- Product : On this page, customers will continue their activities to search for products, from product requests will send product data Which searching for.
- Costumes : On stage furthermore after customer choose product, so customer will the 3D image view of the interior furniture selected by the customer is displayed. After that the customer will change styles on each mesh or side.
- Basket : After the customer makes changes or adjustments to the style of furniture, the customer will sent by system to basket page. Where the contents are data on furniture products that have been selected customer.
- Survey Payments : When customer choose product where Which will bought, so system will displays survey page. this page form payment survey to customer's home address.
- Advance Payment : Then stage second from payment is payment Money advance, page This will also send data on the progress of the survey and the date of the survey and the date will be sent after doing it payment. dp payment, up to to total.
- Total Payment : and the last is the total payment where this payment is a stage rest of the payment stages last after two stages previously.

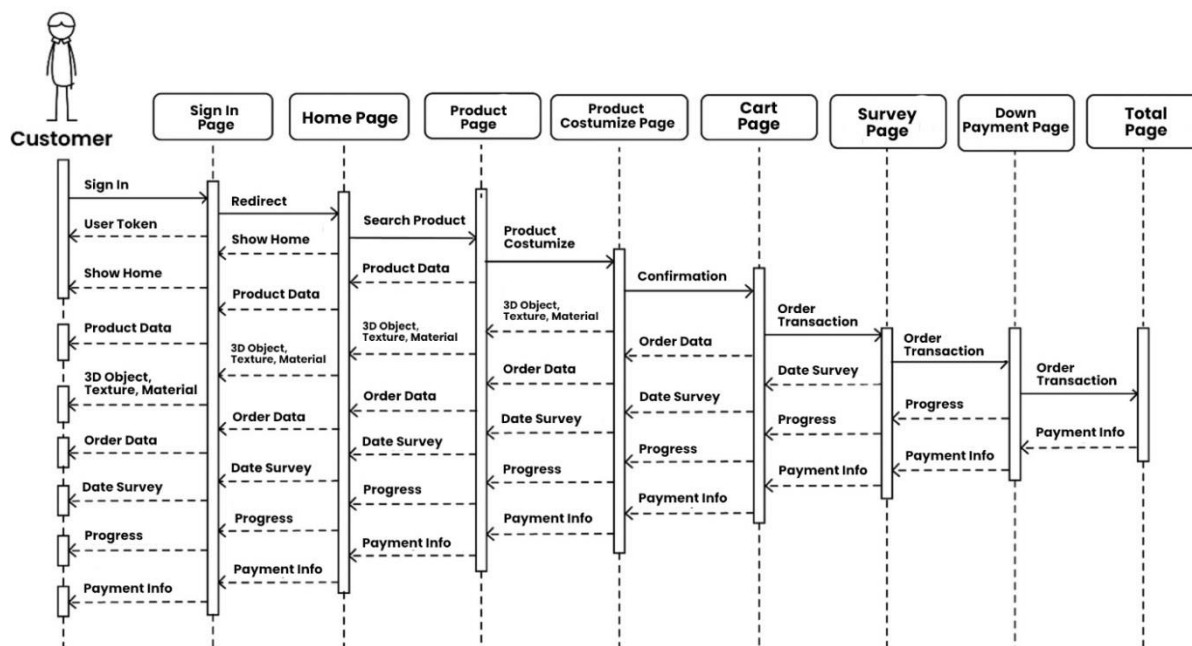


Figure 3. Interior Ordering Sequence Diagram

review

After That, prototype will developed Again until client give agreement For finalization product. Like Which mentioned previously, second This stage will be repeated continuously, until the results are as desired client.

Feedback

After process design or *prototyping* , *feedback* or bait come back Which referred to here include features, functions, visuals, and also the interface of the program currently developed.

Implementation And Launch

In this phase the application or system developer will work according to the prototype that has been approved by the system user, and launches the system has coded on phase previously and also has passed the time testing.

RESULTS

Part Main System

a. Appearance onboarding

*name of corresponding author



The Onboarding view is the initial view where it will run the first time the application is opened. Behind this display, the system will check the user token in the form of a memorable account customer already do login or Not yet (Picture 4).

b. Appearance Enter

Display where customers will input their respective account data before committing viewing activities furniture as well booking. (Picture 5)

c. Appearance Registration

Appearance This is place Where customer do registration If Not yet own account. (Picture 6)



Figure 4. Onboard View

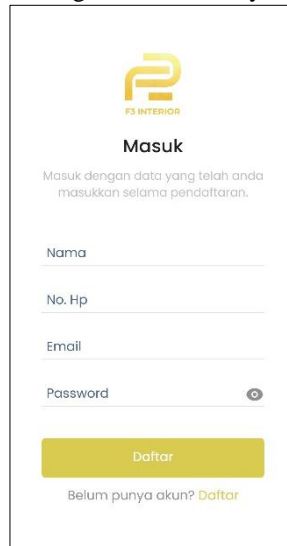


Figure 5. Login View

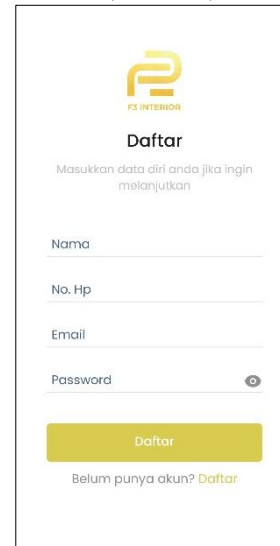


Figure 6. List View

Part Booking Goods furniture

a. Home view

Appearance This is appearance main after do login And before do booking. There isa number of components like carousel, column search, category and ideas interior furniture Figure (7).

a. Appearance Product furniture Interiors

Appearance This is gathering data product furniture with adapt product Which searching for fromsearch view before (Fig 8).

b. Furniture Detail View

This display is a detailed display of furniture products that have been selected by customers (Figure 9)

c. Product Style Customization Display

This display is a customized display for furniture products chosen by the customer by using a three-dimensional image display to select materials and textures including wood materials (Figure 10).

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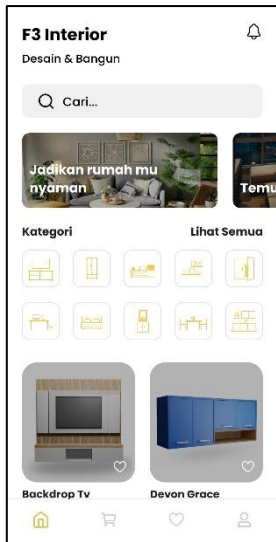


Figure 7. Home view

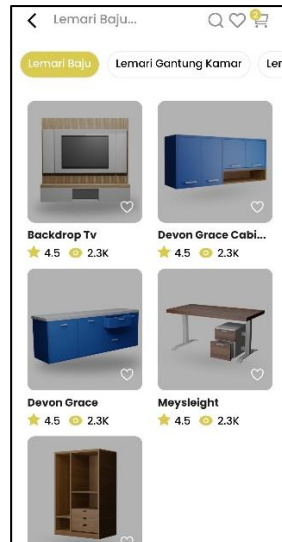


Figure 8. Product Data Display



Figure 9. Product Detail Display

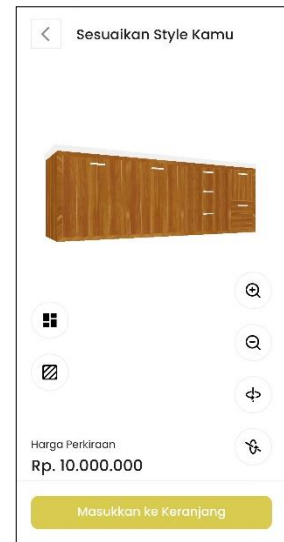


Figure 10. Product Style Adjustment Display

Part Confirmation Payment

Before making furniture, the first step is that the owner of F3 Interior will conduct a survey the customer's house, he will see or review the orders that the customer ordered. For self survey fee will be charged. during this beta period, there was no calculation of regional distance due to sales of F3 InteriorStill on region around Takengon City And Really Merry only (Fig 14).

a. Basket View

This display is a collection of selected furniture product data for further orders by customers (Figure 11)

b. Appearance Payment Survey

Before making furniture, the first step is that the owner of F3 Interior will conduct a survey the customer's house, he will see or review the orders that the customer ordered. For self survey fee will be charged. during this beta period, there was no calculation of regional distance due to sales of F3 InteriorStill on region around Takengon City And Really Merry only (Fig 12).

c. Appearance Payment Advance

The second is advance payment, in this stage the customer will pay up front or down payment arranged by admin or F3 Interior owners themselves (Figure 13).

d. Appearance Payment Total

The last is the total remaining payment. The customer will pay the remaining total of the interior furniture costs ordered (Figure 14).

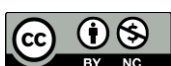
e. Appearance Snaps midtrans

Appearance This is address objective payment with use a third party that is midtrans. Appearance This will run on every stages payment that is among them; survey, dp (Money advance), And remaindertotal (Picture 15).

f. Appearance Success

On end payment completed, so will appear success page (Figure 16).

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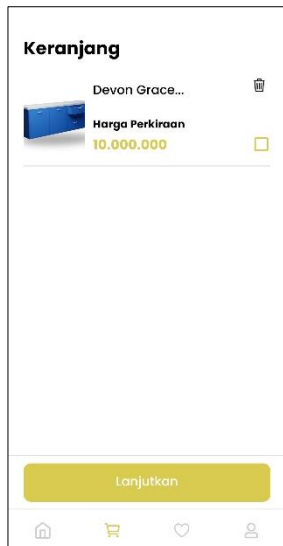


Figure 11. Display Basket

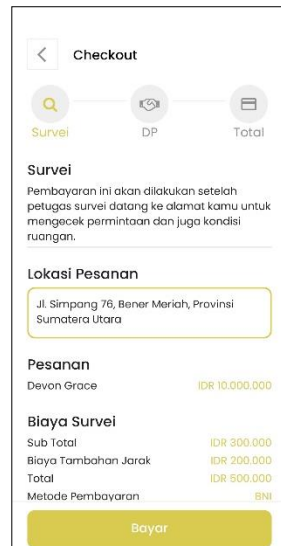


Figure 12. Survey Display



Figure 13. Display of Advance Payment



Figure 14. Display of Final Payment

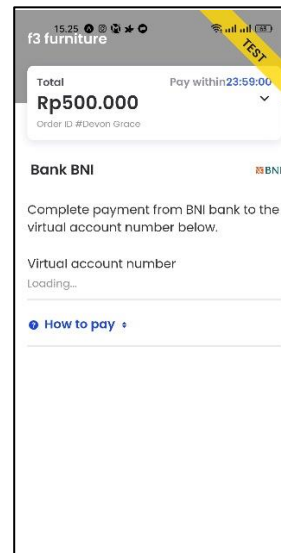


Figure 15. Display of the Midtrans Payment Gateway

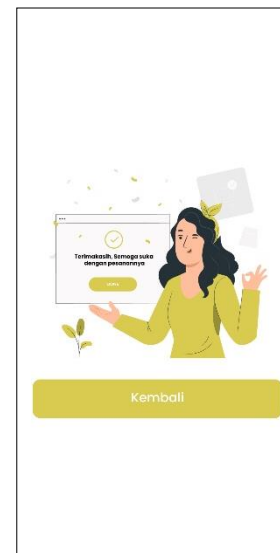


Figure 16. Display Success

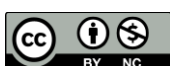
DISCUSSION

After the F3 Interior application has been built, then the developer will then evaluate it or withdo assessment with make list lack as study advanced on system F3 Interiors .

Table 1. Evaluation study feature For forward

| Feat ure | Reason |
|---|---|
| Feature calculation distance survey or deliveryusing Google Folder FIRE | The distance between the F3 Interior sales areas is still spelled out very little, because it's still the only company Which opened in city aceh Takengon. Also in registration Google cloud Service use VISA Where owner company Still Not yet own VISA (Suendri, 2019). |

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| | |
|---|--|
| Feature search data use method LSI (LatentSemantics indexing) | Data Still counted A little Because Still period trial or BETA. It is possible to developed using this method to make searching easier data product. |
| Feature Orbit Movement on 3d view or picture three dimensions so that make it easy previews customization furniture Which want to ordered | This feature is still somewhat complicated, because of the package from feature This Still only on A algorithm development website, Not yet including mobile.camera Orbit Movement moment This Still usebutton |
| On study This product Still form cupboard And table | Because it's still a probation period or system the one with the Beta version. The data entered is relevant A little because Also process making 3d belong need time. |

The table above explains that there are still deficiencies in the system. So that this development will continue in further research, so that the system will be even better.

CONCLUSION

Based on the results of this study and the preceding discussion, it can be concluded that the F3 Interior system can be used, but there are still a number of deficiencies that must be addressed through future research or development. However, for now This application, F3 Interiors, can assist the general public in selecting concepts and estimating the approximate cost of the desired product. With three-dimensional images present, the GLTF algorithm can alter the material or texture of each mesh of a 3D object. This F3 Interior application may also be used as an optional CV for the company in introducing the company to the surrounding community or to one Indonesia concurrently with the company's growth. Again, it is anticipated that additional research or suggestions from the para reader will lead to the improvement of this system.

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