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Maria Kineta

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Developing the Connection of Batik Lasem's E-Commerce Platform and Metaverse

1 Maria Kineta

1 Information System Department
Soegijapranata Catholic University
Semarang, Indonesia
19n40012@student.unika.ac.id
0009-0001-5296-0105

1 Ridwan Sanjaya

1 Information System Department
Soegijapranata Catholic University
Semarang, Indonesia
ridwan@unika.ac.id
0000-0003-3865-5937

1 Bernardinus Harnadi

1 Information System Department
Soegijapranata Catholic University
Semarang, Indonesia
bharnadi@unika.ac.id
0000-0001-5494-3109

1 **Abstract**— Since the Covid 19 pandemic, Batik Lasem's sales have been taking a plunge since they rely heavily on tourists. Combined with the new highway cutting through Lasem, the sales of Batik Lasem has never been lower. Competing against bigger and more established Batik corporate in online sales is not easy, therefore Batik Lasem needs a new method of showcasing and selling Batik virtually through metaverse. Objective of this research is to develop a direct connection system between metaverse scene and e-commerce website. The connection is achieved using Woocommerce as the e-commerce site with payment gateway plugin and 2D objects inside the metaverse scene as a vessel to attach the product URL. The research found that the connection between metaverse and e-commerce site is feasible but not very optimal on some devices. User experience on VR head mount is not optimal for doing transaction but PC and mobile devices do not give the most immersive ambience for users.

1 **Keywords**— batik, e-commerce, metaverse, mozilla hubs, payment gateway

I. INTRODUCTION

Lasem is one of the sub-districts in Rembang, Central Java that is infamous for their hand-drawn Batik. Lasem relies heavily on tourism and Batik sales for living. With the new freeway built cutting through Lasem and Covid-19 pandemic since 2020, Lasem has been struggling with tourism [1].

Covid-19 pandemic increased the intensity of online shopping in Indonesia, plenty of UMKM (micro and small companies) admitted to open up an online storefront after the pandemic [2][4]. But with everyone competing to join the online market, the competition also fiercer, therefore creating a demand of a new model of marketing. Based on Forum Group Discussion (FGD) with the group of Batik Enterprises on August and September 2022, a new media for marketing and showcasing Batik is needed to compensate the decrease in customer from tourism.

Based on the Forum Group Discussion (FGD) with the group of Batik Enterprises in August and September 2022, new media for marketing and showcasing Batik is needed to compensate for the decrease in customers from tourism. A hundred FGD participants agree an innovation in digital marketing should be made.

Metaverse could be described as virtual world with 3D objects as its base [3]. The four classifications of metaverse are augmented reality (AR), lifelogging, virtual reality (VR), and mirror worlds [4]. Although the few users, metaverse could be considered as the new best thing after internet [5].

E-commerce platform is often used for seller selling their products even though is not interchangeable with selling

product through traditional method [6], [7]. E-commerce or e-marketplace use payment gateway as a way to get multiple payment channel for customer to pay for the goods or services offered by the seller. One of many payment gateways available in Indonesia is Midtrans that is not only able to transmit funds in real time, but also the convenience on the application in e-commerce website such as Woocommerce [8].

Companies are starting to use metaverse as a new way of marketing and networking their products [5] but their transaction still happens on separate e-commerce site. It would be more valuable if metaverse could be connected directly to the e-commerce website where customers could make transaction at the same time.

Even though it is uncommon to use metaverse acts as a product display and connects to e-commerce site for transaction on the same system, this is the challenge that will be researched and developed. The objective of this research is connecting metaverse with e-commerce site as the solution for Batik businesses. Researchers discovered that using virtual media such as 360° videos and photos are able to fulfil the requirement for promoting Batik products in Pekalongan [9], therefore, using metaverse as a more immersive expansion of the virtual media should create a new method of promotion that could be adapted by other industry.

This experimental research starts with developing the metaverse scene, followed by developing an e-commerce website, then connecting both metaverse and e-commerce to create a direct connection system. The result can be a prototype for many sellers or any virtual exhibition organizers to provide the Metaverse showroom with a complete connection to the e-commerce website.

II. METHOD

For this research, metaverse scene of several batik enterprises were made and connected to their social media, chat messenger, and e-commerce website. The metaverse scene was developed from scratch with 3D designer and built into a metaverse scene in Mozilla Hubs. The batik displays in the metaverse are connected via link towards the e-commerce site, where customers could begin their purchase of the batik.

A. Developing Metaverse Scene

Metaverse is considered as the new and upcoming media for showcasing Batik Lasem. The term "metaverse" commonly refer to virtual reality, where a world consists of 3D objects is used for users through their avatar to interact, having social relations, even do transaction [10]. Even though metaverse is a well-known term for virtual reality, there are

other models that is also considered as metaverse [4], augmented reality, lifelogging, and mirror worlds.

Virtual Reality is chosen as the metaverse model to bring the virtual showroom for Batik Lasem because of how it represents the metaverse public know, also the flexibility it offers to build a brand-new room or world for showcasing Batik Lasem.

A few software could be used to build metaverse scene such as Unity, Ubiq, Unreal Engine, and Mozilla Hubs [11]. Unity could be considered the most popular software to create virtual reality from scratch, this code-base software is popular in the game development business [12]. Even the great customization feature Unity offers, this software comes with a subscription cost to unlock the premium features [13]. Since Unity is a code-base software, it would be challenging for user that's not familiar with programming to use.

Mozilla Hubs is a WebXR environment, which means it could be accessed from any device with web browser [14]. Mozilla Hubs also comes with a built-in scene builder in form of Mozilla Spoke. No programming is necessary for creating a metaverse scene in Mozilla Spoke [11] since the developer currently removes the feature of adding custom code in Hubs and Spoke public server [15]. Multiple scene templates and architecture kit is available for free. Even though the scene built with only templates and architecture kit could not be customized as much, user can use 3D builder software like Blender to create the 3D objects [16]. Blender usage is advised to create a lighter, more elaborate design for the room or surroundings in metaverse [11]. Mozilla Spoke also has a direct connection to Sketchfab, which is a repository for 3D objects [15]. User can directly use the free 3D objects available in Sketchfab in the scene by placing the Sketchfab URL in the 3D objects generator. If editing is needed for the 3D objects downloaded from internet, it is possible to adjust with the help of 3D editing software like Blender.

For this research, two different rooms are built using Blender and imported to Mozilla Spoke. Multiple objects for displaying Batik such as shirt, dress, clutch, and mannequin was downloaded from Sketchfab. The texture or pattern then altered to Batik Lasem with Blender. Those objects simulate how the Batik pattern will look like when sewed to be clothing piece.

B. Developing E-Commerce Site

One of the free e-commerce templates available is Woocommerce plugin on Wordpress that allows the user to create a personalized e-commerce without any programming. Woocommerce also accept payment gateway and shipping fee calculator plugin to be installed on the e-commerce site. URLs from e-commerce are attached to 2D objects of products, so when customers visit the scene, they could directly go to the destined product page on the e-commerce to do transaction.

It is crucial to implement a payment gateway on a customized e-commerce site so the company may take payments via various channels. With its direct registration requirements, Midtrans is one of the most widely used payment gateways now in use. It is accessible to both businesses and individuals.

One requirement for creating Midtrans account is to have the store web page set up first. If the e-commerce website is still on development, the applicant can add some products on

the e-commerce web page to simulate how the store would look like and what kind of goods it displayed. Midtrans will verify if the e-commerce store is legitimate to complete the registration. This process would take 1-3 working days.

After the process is done, a complete transaction can be paid by using the Midtrans service. A buyer can pay the transaction using a credit card, QR code payment, virtual account, and bank transfer.

C. Connecting E-Commerce Site with Metaverse

The connection between metaverse scene in Mozilla Hubs and E-Commerce sites could be utilized by attaching E-commerce URL on link Href on the 2D object properties. The connection method was written in the official Mozilla Spoke documentation [17]. Using link elements is also possible to connects metaverse with e-commerce, but links shows the whole e-commerce page referred rather than showing the specific image of the Batik displayed in which does not blend well with the metaverse scene.

III. RESULT AND DISCUSSION

The flowchart of the experiment consists of providing a metaverse scene, linking the e-commerce website to a payment gateway, and creating the connection from a metaverse object to the e-commerce web page.

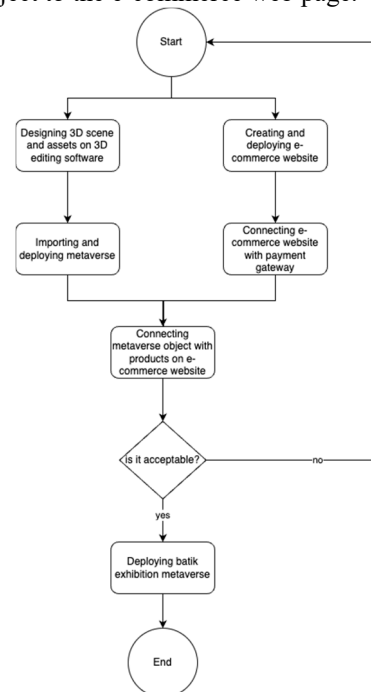


Fig 1. Research flowchart

A. Result

1) Metaverse Scene

Metaverse scene that was created in Spoke have to be applied in Mozilla Hubs in order to be able to accept visitors. Since it is a free software, several limitations can be found on Mozilla Spoke and Hubs. Mozilla Spoke can only accept a total of 128MB of file size [18]. If the assets accumulated inside a Spoke project is bigger than the limit, the scene can't be published in Hubs.

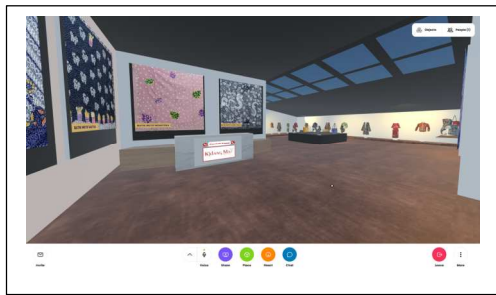


Fig 2. Batik exhibition simulation on metaverse

Figure 2 is an example of the scene that the users will experience when visiting metaverse scene on PC. Hubs can only accept up to 25 visitors at one moment, if more than 25 users accessing the same Hubs at the same time, the remaining visitors are being put in a waiting room, which can only spectate the scene, but not interact in any way or even show up on other user sight [18].

Link shortener tools could also be used to simplify Href-adding process on the 2D objects. Popular link shortener such as Bitly and TinyURL are available for free or with paid plans [19]. Wordpress also have plugins that could be used as link shortener, one of the popular ones is Shortify which also could be used for free or paid for the premium features. Using Shortify as the link shortener could make the links easier to remember.

User could change the content or the long URL that needs to be shortened and keep the same URL attached on the metaverse. Link shortener could be useful not just for remembering the e-commerce URL, but making the 2D objects dynamic. As long as the same shortened URL is attached as the source of object, shortened URL will update anytime the original URL's content does.

2) E-Commerce Connection with Midtrans Payment Gateway

The e-commerce website developed using Woocommerce plugins is easy to use by user even without any programming background. Woocommerce also allows other plugins to be combined with the e-commerce template to increase user's online shopping experience such as Woongkir that automatically counts shipping fee to desired address and to payment gateways which allows customer to pick payment method available. More than one payment gateway or other payment method could be applied on one e-commerce site, the admin only needs to change the settings if necessary.

Midtrans is meant to accept payments from multiple channels such as QRIS and Bank Transfer. The payment method seamlessly attached inside Woocommerce website through the Midtrans plugin and triggered when customers are purchasing the products. Batik enterprises could check if the funds are paid or not on real time from Midtrans's Dashboard.

Midtrans also charge MDR (Merchant Discount Rate), payment fee, and transfer fee to the business owner. Customer only pays the amount that shows up on the checkout page, which could include shipping fee and tax. Each payment method has different MDR, some are percentage like credit card and QRIS, but some are fixed rate like bank transfer payment. Minimal amount of funds accumulated that could be withdrew to the business's bank

account is IDR 50,000 and the funds also will be charged with IDR 5,000 withdrawal fee.

1) Metaverse Connection with E-Commerce Site

The connection between Mozilla Hubs metaverse scene and e-commerce product page is achieved through attaching product URL on 2D displays on metaverse scene, preferably if the 2D object is the image of said product. Since it is still impossible for user to attach external URL or Link Href in 3D objects, 2D objects like videos and photos is the only solution. Visitors of metaverse could click on the button showed up on 2D objects when the cursor hovers or visitor is holding space button on keyboard. That button redirects visitors to the product site or connects them in chat application with Batik enterprise representatives.

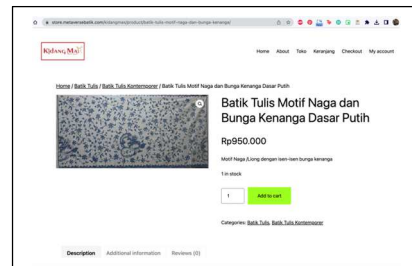


Fig 3. Product example on e-commerce site at store.metaversebatik.com

Figure 3 shows an example of product page on the e-commerce website that is going to be attached on the metaverse. This is the page that visitors saw when they click the button on the image in metaverse scene.

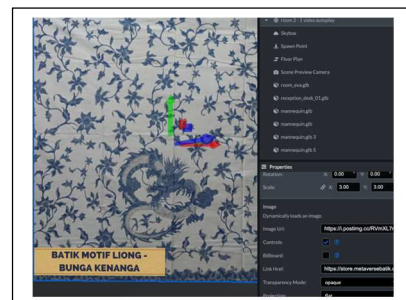


Fig 4. Link attachment settings on batik display in Mozilla Spoke

Changing and adding images or videos in Spoke could be done by 2 methods, first is uploading the raw material into the user's Spoke asset collections, and the second method by adding blank image elements and changing the Image URL on properties as shown on Figure 4. Image properties is also used to attach External URL of product e-commerce page commerce through Link href textbox.

4) Implementation

Metaverse scene that was made for batik exhibition then is used by the batik enterprises owners for displaying and selling their products at the same time. The batik community was enthusiastic in trying out the batik exhibition on metaverse scene. The acceptance of using the metaverse scene and VR head mount is quite high, although some visitors also complained about the strange sensation of walking in the metaverse scene, even a small percentage of the visitors are concerned about motion sickness that occurred during taking a stroll inside the metaverse scene.

B. Discussion

Connection of the batik exhibition metaverse scene and e-commerce website were tested on the accessibility, comfortability, and the overall usage of the connection between metaverse and e-commerce site. Testing on several media such as smartphone, laptop/PC, and VR head mount was done to find the most comfortable and accessible platform for this new exhibition method. Other than the hardware, testing on different time with different internet speed was also done to find the limitation on comfortability of user when accessing the contents.

1) Metaverse

The initial loading time of metaverse scene is closely correlated with internet speed; the faster and higher-quality internet used, the shorter the initial loading time is. Resources will also collect when videos are playing in a metaverse scene if there are any.

In a scenario where the internet speed is not optimal, objects could be shown blank with a notice of broken media link text. On some cases, the metaverse visitors could reload the object by clicking space button and select refresh. This feature might not be easily known by first timers, so the availability of some kind of tour guide or store attendant is helpful to give visitors an answer for technical problems and product info.

Only 2 videos can be played simultaneously in a room with more than 3 videos playing automatically or being played. Also, this will result in the random pausing and playing of the videos, which will swap between them. In order to prevent this from happening, the developer should try to limit the number of videos they utilize. If they absolutely must, it is preferable to set the video to play just when the visitor plays it, rather than auto played each time a user enters the room.

Table 1 Maximum number of videos in a scene

Numbers of Videos	Result
≤ 2	all videos played at the same time
>2	only 2 videos could be played

Table 2 Assets display on metaverse

Internet Speed	Result
Optimal	all assets
Not Optimal	several broken assets

2) E-Commerce Connection with Midtrans Payment Gateway

Whenever customer is checking out products from their cart, the available payment methods are listed on the page. If Midtrans is chosen as the preferred method, then it will also list out the choices of payment method available. The admin or business owner could change the settings whenever they need.

In testing payment, Midtrans limits the number of chances to pay by default into 1 time only. If customer accidentally closed the payment window, the payment could not be completed and will be pending forever on the Woocommerce dashboard. The transaction will fall into expired or failed category on the Midtrans dashboard. The limit could be changed in Midtrans dashboard to the desired number of

trials. The completed or success payment could not be paid again. The only solution after failing to pay after the payment limit is as easy as making a new order. This seems easy for customers, yet the order stacks on the Woocommerce dashboard, so the failed order is cluttering the orders page.

The basic bundle when individuals or enterprises are approved by Midtrans to be able to use their payment gateway only allows payment from bank transfer and Gopay QRIS. Unlocking more payment method takes a few more documents depend on the payment method selected. When the products costs more than a few hundred thousand of rupiahs, MDR from bank transfer payment of IDR 4,000 will be equal or even less than 1.7% MDR from Gopay QRIS. Owner of Batik enterprises needs to consider payment methods available for less MDR charged.

3) Connection between Metaverse and E-Commerce

There are few findings in regarding the connection between e-commerce sites and metaverse scene:

- Limitation on features; product URL that was attached to 2D objects in the scene could only be added in Mozilla Spoke. So random user won't be able to add or change the URL making it safer for business owner. Customers that clicked the button were redirected to another browser tab that shows the products e-commerce page and could made purchase then and there.
- Limitation on accessing the payment method with VR head mount; the attachment of product page URL in 2D objects inside metaverse scene is inconvenient to use in VR head mount device because the user will be thrown out of the metaverse to get to the product page. Doing payment using VR head mount also more difficult to navigate since the payment methods on the free tier needs bank transfer from banking apps or scanning QRIS. Even if the VR head mount is connected to debit or credit card, Midtrans still needs the card number and other authentication to make payment, in which is still not automated in VR head mount browser.
- Limitation on immersive ambience on non-VR device; redirection to another browser tab on non-VR head mount device is like switching browser tab as usual. Only able to see the metaverse room through flat screen reduces the immersive ambience that VR wants to achieve. Although the only visible difference of accessing metaverse on mobile device like smartphone and PC is that on mobile device is when a user enters metaverse scene, it automatically changed into full screen mode. Another limitation is the inconvenience of opening a product page while still inside metaverse in mobile device is that the user will be counted as leaving as they exchange browser tab. On PC, entering the metaverse does not change the tab to be full screen automatically. Whenever user click on the product URL button, another tab opened and user can see the product page on e-commerce while still active on metaverse. PC user can as far as split their screen with other application while still inside the metaverse. PC is the most ideal platform for doing payment with Midtrans while still using the basic package. Scanning QRIS or getting the bank account number for transfer is easier on PC because the payment is done in smartphone.

IV. CONCLUSION

This project was undertaken to develop connection between Batik Lasem's e-commerce and metaverse showroom. Metaverse, although is still considered new, is gaining popularity each day. Metaverse that used to exhibit/showcasing Batik is a new and novel method of marketing. Mozilla Hubs could be utilized to create a showroom or exhibition of Batik that connected to e-commerce website through URL's embedded in the 2D objects.

Using 2D objects inside the scene as a way to displayed the Batik pattern also connects to external e-commerce URL is simple enough to execute yet effective in making customers observe the product on a more realistic approach than only using pictures on a regular web page. Even though possible, it is still not the most effective way to connects e-commerce page in the metaverse because it will redirect user into other tab. The redirection was uncomfortable on VR head mount where user used to be able to explore in the room, then ejected out to go to the regular browser tab. The same thing happens on smartphone users. PC users on the other hand is the most ideal device for accessing e-commerce sites from metaverse because it would not expel the user from metaverse while browsing on the e-commerce page on another tab.

Batik enterprises has only started to use metaverse as their virtual display. Many still needs adjustment from using 2D social media platform and chat messenger for displaying their products to a metaverse scene. The level of acceptance from customers and visitor is still minimal, although the batik enterprises are accepting and excited over the new metaverse and its connection to e-commerce directly. The batik community is excited on the future of digital display and exhibition with metaverse.

In conclusion, the development of connection between Batik Lasem's e-commerce and metaverse Batik showroom is feasible but might not be very optimal for transaction on every device because of the limitations on the discussion. PC is the most optimal device for e-commerce page connection but might not feel very immersive since user still needs to switch tab to shop. VR head mount gives the best ambience and environment for visitor to feel like inside a real Batik showroom but also hard to make a purchase because the limited payment method available. As a media to showcased and selling Batik products, the current technology on metaverse is enough to be able to give customer and merchants a way to interact and selling Batik in a new and novel experience.

Further research on how to make an immersive web browser inside the metaverse is needed to create a more cohesive environment. Also, research on user acceptance on metaverse usage for Batik marketing is needed in the future. Hardware and software research on metaverse acceptance is also needed to find the limitation on each device used for accessing metaverse comfortably.

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