

Surat Tugas

Nomor : 00105/K.6.4/ST.Ikom/01/2023

Dekan Fakultas Ilmu Komputer Universitas Katolik Soegijapranata Semarang dengan ini memberikan tugas kepada:

Nama :1. Prof. Dr. RIDWAN SANJAYA, S.E., S.Kom., MS.IEC.
2. G. FREDDY KOESWOYO, S.E., M.Si.
3. Dr. THERESIA DWI HASTUTI, S.E., M.Si.

Status :Dosen Universitas Katolik Soegijapranata

Tugas :Penulisan Artikel Ilmiah "Technical Aspects of Metaverse Development for Batik SMEs Exhibitions" pada "2022 20th International Conference on ICT and Knowledge Engineering (ICT&KE)" di Bangkok Thailand
Karya ilmiah yang dimuat dalam prosiding ber-ISBN tingkat internasional

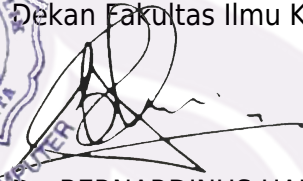
Waktu :05 September 2022 s.d 05 Februari 2023

Tempat:Bangkok Thailand

Harap melaksanakan tugas dengan sebaik-baiknya dan penuh rasa tanggungjawab serta memberikan laporan setelah selesai melaksanakan tugas.



Semarang, 31 Januari 2023
Dekan Fakultas Ilmu Komputer


Dr. BERNARDINUS HARNADI, S.T., M.T.



The Certificate of Participation
is awarded to

Ridwan Sanjaya

Technical Aspects of Metaverse Development for Batik SMEs Exhibitions

From IEEE ICT & Knowledge Engineering 2022 Conference

November 23-25, 2022, Siam University, Bangkok, Thailand

W. Premchaiswadi

Prof. Dr. Wichian Premchaiswadi
Steering Conference Committee & Organizing Committee Chair



All



ADVANCED SEARCH

Conferences > 2022 20th International Confe... ?

Technical Aspects of Metaverse Development for Batik SMEs Exhibitions

Publisher: IEEE

Cite This

PDF

Ridwan Sanjaya ; Theresia Dwi Hastuti ; Freddy Koeswoyo All Authors

29 Full Text Views



Back to Results | Next >

Need Full-Text
access to IEEE Xplore for your organization?
CONTACT IEEE TO SUBSCRIBE >

Abstract

Document Sections

- I. Introduction
- II. Metaverse Terminology
- III. Technical Aspects
- IV. Concepts of Batik SMEs Exhibitions
- V. Conclusions

Abstract:

Lasem Batik, which is famous for its uniqueness in the 3 ethnic elements, is currently experiencing considerable challenges due to changes in traveler routes between provincial capitals. Batik craftsmen need events and innovations to showcase their products as before the Covid-19 pandemic, to attract the attention of buyers at the local and global levels. One of the innovations that make it possible to showcase their products and meet with various parties at the local and global level is Metaverse. Metaverse is seen as a solution to display Batik products in their entirety without having to be disturbed by road access barriers to their village and the increasing prices of airline tickets between countries to their countries. The metaverse that was developed to organize the Batik exhibition requires technical details that need to be prepared. This paper explores the technical aspects of developing Metaverse for Batik exhibitions that can result in business transactions.

Published in: 2022 20th International Conference on ICT and Knowledge Engineering (ICT&KE)

Date of Conference: 23-25 November 2022

INSPEC Accession Number: 22413462

DOI: 10.1109/ICTKE55848.2022.9983314

Date Added to IEEE Xplore: 19 December 2022

Publisher: IEEE

Conference Location: Bangkok, Thailand

► **ISBN Information:**

► **ISSN Information:**

► **Funding Agency:**

I. Introduction

Metaverse as a business term has been successfully viral by Mark Zuckerberg even though this term has actually been mentioned for a long time in many books and papers [1] , [2] . Some companies refer to this term as not only a virtual reality (VR) space as illustrated by Meta, but also augmented reality (AR), mixed reality (MR), or even extended reality (XR). In defining its virtual world, the tools used are not only using virtual reality glasses, but also augmented reality glasses, smartphones, or even using a laptop. Agreement in defining the term metaverse has

Sign in to Continue Reading

More Like This

Managing Security Threats and Vulnerabilities for Small to Medium Enterprises

2007 IEEE Intelligence and Security Informatics
Published: 2007

Is the Agile Development Method the Way to Go for Small to Medium Enterprises (SMEs) In Saudi Arabia?

2018 21st Saudi Computer Society National Computer Conference (NCC)
Published: 2018

Show More

**Intermag 2023
Sendai, Japan
May 15-19**

Learn More

Authors



Figures



References



Keywords



Metrics



IEEE Personal Account

[CHANGE USERNAME/PASSWORD](#)

Purchase Details

[PAYMENT OPTIONS](#)

[VIEW PURCHASED DOCUMENTS](#)

Profile Information

[COMMUNICATIONS PREFERENCES](#)

[PROFESSION AND EDUCATION](#)

[TECHNICAL INTERESTS](#)

Need Help?

[US & CANADA: +1 800 678 4333](#)

[WORLDWIDE: +1 732 981 0060](#)

[CONTACT & SUPPORT](#)

Follow



[About IEEE Xplore](#) | [Contact Us](#) | [Help](#) | [Accessibility](#) | [Terms of Use](#) | [Nondiscrimination Policy](#) | [IEEE Ethics Reporting](#) | [Sitemap](#) | [IEEE Privacy Policy](#)
A not-for-profit organization, IEEE is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

© Copyright 2023 IEEE - All rights reserved.

Feedback

Technical Aspects of Metaverse Development for Batik SMEs Exhibitions

Ridwan Sanjaya
Information System Department
Soegijapranata Catholic University
Semarang, Indonesia
ridwan@unika.ac.id

Theresia Dwi Hastuti
Accounting Department
Soegijapranata Catholic University
Semarang, Indonesia
theresia@unika.ac.id

Freddy Koeswoyo
Accounting Department
Soegijapranata Catholic University
Semarang, Indonesia
freddy@unika.ac.id

Abstract— Lasem Batik, which is famous for its uniqueness in the 3 ethnic elements, is currently experiencing considerable challenges due to changes in traveler routes between provincial capitals. Batik craftsmen need events and innovations to showcase their products as before the Covid-19 pandemic, to attract the attention of buyers at the local and global levels. One of the innovations that make it possible to showcase their products and meet with various parties at the local and global level is Metaverse. Metaverse is seen as a solution to display Batik products in their entirety without having to be disturbed by road access barriers to their village and the increasing prices of airline tickets between countries to their countries. The metaverse that was developed to organize the Batik exhibition requires technical details that need to be prepared. This paper explores the technical aspects of developing Metaverse for Batik exhibitions that can result in business transactions.

Keywords—batik, exhibition, lasem, metaverse, virtual

I. INTRODUCTION

Metaverse as a business term has been successfully viral by Mark Zuckerberg even though this term has actually been mentioned for a long time in many books and papers [1], [2]. Some companies refer to this term as not only a virtual reality (VR) space as illustrated by Meta, but also to include augmented reality (AR), mixed reality (MR), or even extended reality (XR) technology [3]. In exploring its virtual world, the tools used are not only using virtual reality glasses, but also augmented reality glasses, smartphones, or even using a laptop. Agreement in defining the term metaverse has not been agreed upon yet.

However, as an opportunity to introduce products and seek momentum to attract the attention of many people, there is a lot of hope in the metaverse. Moreover, the possibility of bringing together many people globally in one location is also possible. Opportunities to see products, discuss, bargain, or even transact face-to-face virtually, can be realized in this virtual world. This opportunity can increase the chance of selling. This kind of hope is needed by businesspeople, including SMEs, to develop their businesses in the current economic situation, during the pandemic recovery, and the high cost of travel between countries.

Lasem as a sub-district in the city of Rembang in Indonesia is famous for its three-ethnic batik at the local and global levels [4]. However, since the massive expressway was built in Indonesia, travelers' routes have changed and do not pass via Lasem when they travel through the main route between the two provincial capitals [5]. Likewise, during the Covid-19 pandemic until today, the number of foreign tourists has decreased. Both of these cause the numbers and value of batik sales to decrease significantly. Several efforts have been made

by batik craftsmen to increase sales, for example through e-marketplaces and social media. Although there has been a decent increase, innovation is needed to increase sales value like before the expressway and the Covid-19 pandemic.

Metaverse is an interesting innovation to be explored because it can be a link between batik craftsmen and batik-loving communities at the local and global levels. In addition to being able to see batik cloth fully stretched in the metaverse, 3D space in cyberspace allows them to display their batik in the form of a complete ready-made outfit using a mannequin. If an expo of clothes and batik is made in the metaverse, the expo can be visited by people from all over the world. The technical aspects of making batik SMEs exhibitions in the metaverse world will be explored in this paper.

II. METAVERSE TERMINOLOGY

There is no standard definition for interpreting metaverse yet, but most of them refer to a virtual world in which it is possible to interact with other users. Several principles such as the creation of communication in virtual platforms, the meeting of various parties in virtual spaces, and the realization of collaboration of parties in the meeting room, have existed in Second Life [6], Roblox, Minecraft [7], PUBG, Fortnite, Zoom, Google Meet, Microsoft Teams, Webex Meetings, or VRChat.

Metaverse seems to be a combination of all the expectations of the different user experiences that are separated in each type of software. The desire to build a new world in virtual reality creates the need to dress well, have a suitable appearance, and have a place to live that represents his personality or an office that represents his business.

According to this broad understanding, Meta has an understanding that leads to virtual reality where users enter the virtual world and interact in it. While NVidia has the term Omniverse [8] which refers to a multi-party collaboration platform for creating digital content. The virtual space in question is the NVidia platform which contains a network of users of graphics tools from various vendors who work together to form 2D and 3D products.

MagicLeap uses the MagicVerse term [9] to refer the Augmented Reality which brings various virtual objects into the real world. The use of glasses is intended to view virtual objects that are added to the real-world environment around the user. In addition to presenting inanimate objects, it is also possible to display living objects, animals, or even humans. The intended interaction allows the user to touch, talk, or perform experiments on Augmented Reality objects.

Huawei has the term Cyberverses by using Augmented Reality [3], [10] as well as MagicLeap through the screen

display inside a smartphone. Users can see various virtual objects that are added to the real world through smartphones. Cyberspace combines digital maps with high precision to enable the integration of various digital objects in various locations.

This difference in concept may condense into Mixed Reality which combines both Augmented Reality and Virtual Reality into the metaverse [3]. Users can be in the real world or virtual world as needed, able to present virtual objects wherever they are, and can interact with these virtual objects. When needed, users can come to the real space of other users which is a virtual space for themselves, as well as interact with virtual objects that are on the other side of the user. But on other occasions, the two can still meet in the desired virtual space, so that the boundaries between virtual space and real space become invisible.

In the metaverse, it is possible to make transactions between users globally [11]. NFT or Non-Fungible Token is one way that is considered to be used in bridging these needs. NFT is a public certification that states ownership and can be traded using a medium of exchange in the form of currency or crypto assets adopted in the NFT market [12].

III. TECHNICAL ASPECTS

Several technical aspects should be considered in creating a metaverse exhibition for batik artisans. There is the provision of platforms and servers, development of 3D exhibition rooms, presentation and arrangement of 3D contents in every room, connection between exhibition rooms, and availability of infrastructure for communication or transactions with batik artisans.

A. Platform and Server

One of the open-source and free metaverse platforms is Mozilla Hubs [13], which can be downloaded and installed on the Virtual Private Server (VPS) or using a website-based Mozilla Hubs application that can be used for free. The source code of Mozilla Hubs is downloadable on GitHub. If metaverse developers use the Mozilla Hubs service provided on the internet, they do not need to buy a web hosting service and can develop virtual reality content directly on hubs.mozilla.com without installing any software. However, metaverse developers need to install the Mozilla Hubs package if they use VPS. The Application developers can choose to use AWS or Digital Ocean [14] which provides droplets of Mozilla Hubs or choose other web hosting services to install the source code of Mozilla Hubs from GitHub.

The decision to choose how to present batik content in 3D space through the services provided at hubs.mozilla.com or build Mozilla Hubs on VPS depends on the brand to be built and the capacity to accommodate visitors in the virtual space. If a VPS is used, then the brand that is built will represent the professionalism, capacity, and name of the company or metaverse developers. Meanwhile, if the services provided by Mozilla shown in Figure 1 are used, the visitor capacity is limited to 25 people at the same time [15] and the Mozilla brand cannot be separated from the public's attention. As an exhibition at local and global levels, managing the image of a professional activity that does not use free services is important in inviting the public from a certain level. However, at the community level, the use of free services can be used to test interest.

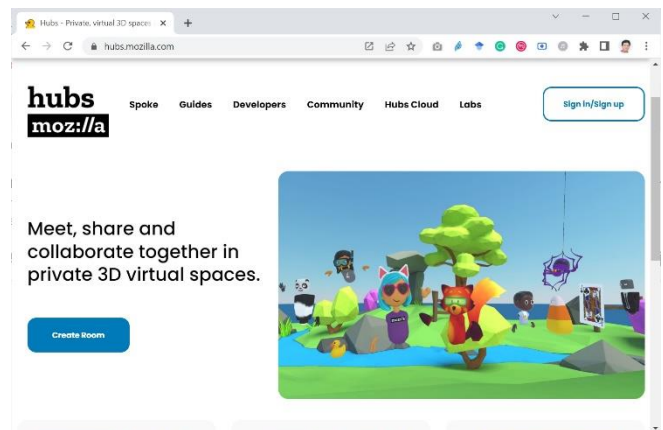


Fig. 1. Mozilla Hubs platform

B. Exhibition Room

Mozilla Hubs provides room templates and furnishings that can be added with other 3D objects and are ready to be used as a meeting place [16]. However, the theme of the room can be the same as other Mozilla Hubs users and does not reflect certain business characteristics. The use of Mozilla Spoke shown in Figure 2 is recommended to develop a theme room according to the characteristics of the business. If the theme is related to art and culture, then the decoration of the room can be adjusted to the characteristics of a classic or traditional room. Mozilla Spoke does not use any interior design background expertise or related software, does not have to install software because it is web-based, and does not have to be an expert in computers. All the tools for building rooms are provided in it and connected to the Sketchfab service [17]. The developers only need to learn how to build the rooms layer by layer using Mozilla Spoke.

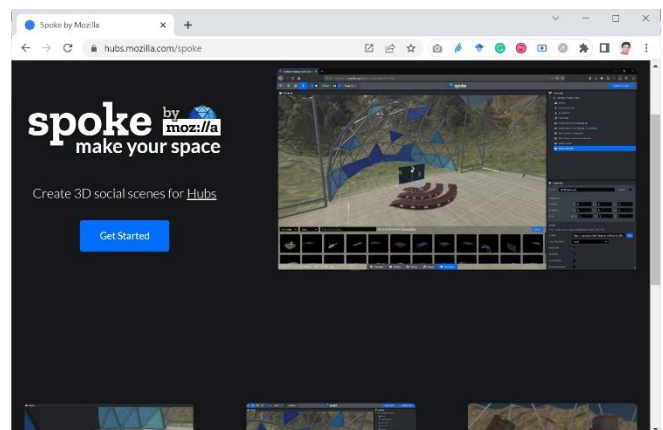


Fig. 2. Mozilla Spoke

However, if the developers have expertise in the use of design software such as Blender, Maya, 3Ds Max, or others [18], their work can be used in Mozilla Spoke. It is recommended to use Blender because there is a Hubs Exporter for Blender add-on for easy asset repair and development [19]. Objects generated from the 3D design software can be imported into Mozilla Spoke and combined with various other existing building elements. The advantage of objects generated by design software is that they can be smaller in size compared to using the assets available in Mozilla Spoke. In making a room that is complex and requires a lot of detailed objects, the use of 3D design software will be very helpful. Due to the small object size, it is possible to add as many

objects as desired up to a limit of 128MB [20] to be exported by Mozilla Spoke and used by Mozilla Hubs.

C. Three-dimensional Contents

Mozilla Spoke and Hubs provide supporting 3D objects and connect with the Sketchfab service so that developers can easily add objects they find interesting to showrooms. The addition of batik cloths into the room is also facilitated with the upload feature in it, so that batik cloth can be stretched on the wall like a batik exhibition that has been held so far. The example of uploading and placing batik cloth on the wall can be seen in Figure 3.

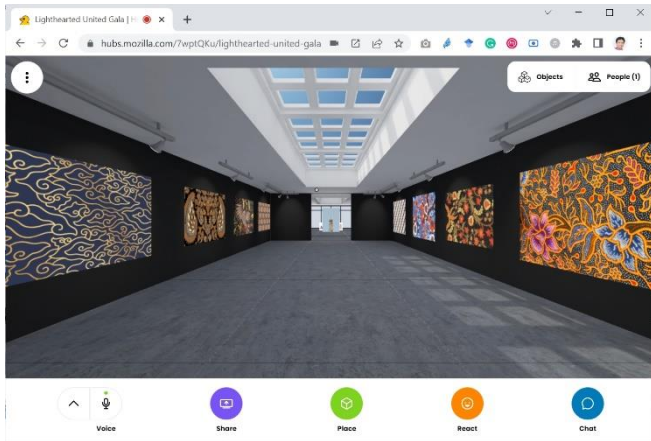


Fig. 3. Batik Showroom prototype in Mozilla Hubs

However, not all object needs in the room can be provided by Mozilla Spoke and Hubs. The character of objects that are specific to art and culture can often only be obtained from making them yourself. The use of 3D design software such as Blender will facilitate the development of these objects. Similar to the previous 3D room creation, 3D objects to fill the room created by 3D design software are also small so that the showroom can be more detailed and complete. Mannequins using batik clothes are also needed to be shown for making the exhibition situation in the metaverse closer to reality.

D. Connection Between Exhibition Rooms

The 128MB limit for the size of each room in Mozilla Hubs [20] means that rooms cannot be created in large sizes. Enlargement of the room also increases the assets in the room. The total size of the room and the assets in it can exceed 128MB. If the assets are compressed, then the quality of the products on display will decrease and reduce the interest to see.

However, the limited size of each room in Mozilla Hubs can be overcome by connecting the rooms for each batik craftsman, as long as there is a link to other rooms [21] or there is a lobby space that allows visitors to choose directly the room that is connected to the exhibition catalog. Mozilla Hubs provides a feature to link to other Mozilla Hubs address rooms. The developers simply create a natural graphical display to connect to other rooms or other supporting infrastructure.

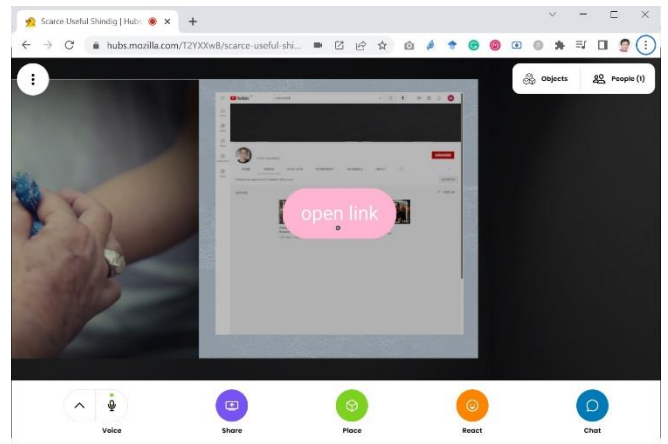


Fig. 4. A link feature in Mozilla Hubs

E. Communication and transactions infrastructure

When exhibition visitors are interested in the products displayed indoors, digital infrastructure is needed to receive feedback and purchase transactions. However, creating a virtual store that responds to buyers in the exhibition space, requires a connection to the existing digital infrastructure. The link feature discussed earlier and seen in Figure 4, can be used to link Google Forms, Jotform, or other online forms to receive feedback. A similar treatment can be implemented for the purchase transactions, the link feature can be used to connect to existing e-marketplaces for managing the shopping cart until the payment.

The combination of link features in Mozilla Hubs and e-marketplace is needed to simplify and bridge business transactions that are currently not available on the Mozilla Hubs platform. Currently, the international payment process still requires filling in a credit card number or taking several steps to make a money transfer. Simple mechanisms such as payments using QR codes are needed to bridge international payments and make it easier when transactions occur in the metaverse.

Cryptocurrencies or NFTs may take some time to become known to ordinary people. Various payments that currently exist may still be needed for use in the virtual world. There needs to be a solution to fill the gap between using cryptocurrencies, NFT, or other global payment mechanism innovations. The implementation of e-marketplaces for a long time in various countries has proven the need to provide various payment methods on e-marketplaces to be accepted by many users.

IV. CONCEPTS OF BATIK SMEs EXHIBITIONS

Based on the technical aspects that have been explored previously, the Batik SMEs exhibition in the metaverse can be held virtually by providing virtual rooms to represent each tenant. Each room will be connected to another room via the link feature provided in Mozilla Hubs and Spoke. Connectivity between rooms can be illustrated in the form of maps pictures or directions, similar to many exhibitions in the real world today.

In each room, Batik SMEs not only display the batik cloth on the wall but also necessary to provide several mannequins to display ready-to-use Batik outfits. The addition of a mannequin with a batik shirt can be created by making 3D assets in Mozilla Spoke, Blender, or other 3D design software. The appearance of the ready-to-use Batik outfit will make it

easy for visitors to visualize and choose the appropriate Batik cloth for them. Information about each asset in the virtual space is also needed to make it easy for visitors to understand the history, process, and values.

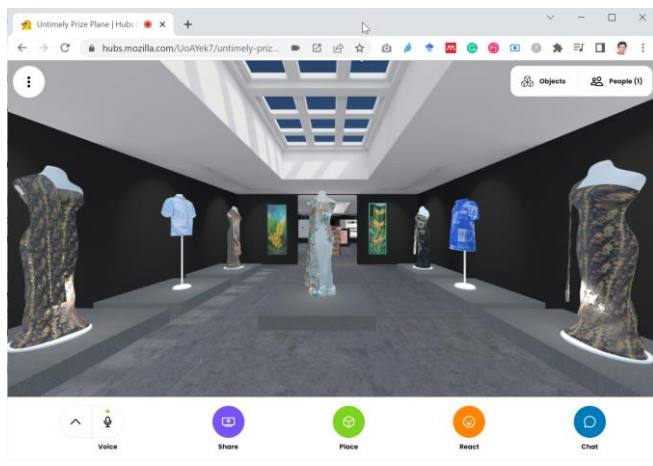


Fig. 5. Mannequins at Batik Showroom

Moreover, there needs to provide links to the e-marketplace, a feedback form, or a contact to an instant message application on the main table, each mannequin, or each batik cloth. The form links can be represented by a button, sign, or label. The target is to handle transactions and communication quickly when batik craftsmen are not in the exhibition room. Links to access e-marketplaces, feedback forms, and contacts to an instant message application need to be prepared in advance. Visitors should not take a long time to browse web pages outside the virtual room.

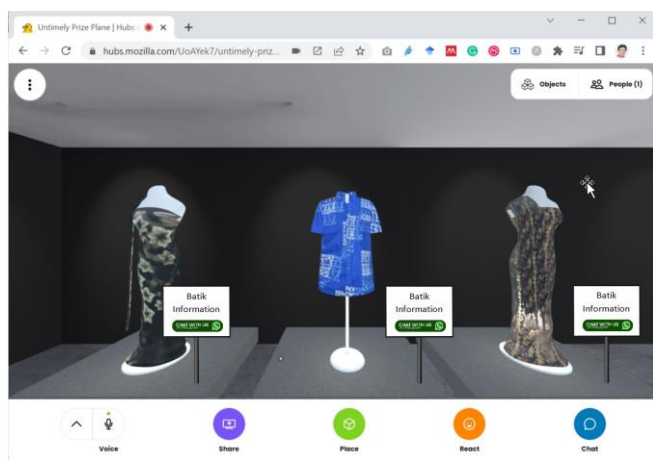


Fig. 6. Information and Communication Sign

V. CONCLUSIONS

A modest metaverse exhibition for Batik SMEs can use the Mozilla Hubs platform which is provided free of charge at hubs.mozilla.com. However, to represent the professionalism, capacity, and name of the event organizer or metaverse developers, VPS installation is a necessity. The technical aspect that needs to be considered is the creation of 3D rooms and the filling of assets using Mozilla Spoke or 3D design software such as Blender, Maya, 3Ds Max, or others. Blender is recommended to be used because there is a Hubs Exporter for Blender add-on for ease of asset repair and development.

To expand the possibilities for many batik SMEs to be involved in the exhibition, it is necessary to create a sufficient

number of rooms and connect them to each room using the link feature via Mozilla Hubs or Mozilla Spoke. The links usage can also be used to connect rooms with e-marketplaces or consumer media to provide feedback to Batik SMEs. The addition of the link to the e-marketplace is intended to facilitate the handling of purchasing opportunities when consumers are interested in the products on display.

ACKNOWLEDGMENT

This research was funded by the Indonesian Ministry of Education, Culture, Research, and Technology under the scheme of the Kedaireka Matching Fund in 2022 titled Metaverse-Based Batik Event Organizing Platform for Increasing and Expanding Lasem Batik Sales Channels.

REFERENCES

- [1] J. D. N. Dionisio, "3D Virtual Worlds and the Metaverse : Current Status and Future Possibilities," *ACM Comput. Surv.*, vol. 45, no. 3, pp. 1–38, 2013.
- [2] A. A. Gaafar, "Metaverse in Architectural Heritage Documentation & Education," *Adv. Ecol. Environ. Res.*, vol. 6, no. 10, pp. 66–86, 2021.
- [3] S. Mystakidis, "Metaverse," *Encyclopedia*, vol. 2, no. 1, pp. 486–497, 2022.
- [4] T. D. Hastuti, R. Sanjaya, and F. Koeswoyo, "The Investment Opportunity, Information Technology and Financial Performance of SMEs," *Proc. - Int. Conf. Comput. Inf. Sci. Sustain. Tomorrow with Digit. Innov. ICCOINS 2021*, pp. 247–251, Jul. 2021.
- [5] R. Sanjaya, T. D. Hastuti, and G. Freddy Koeswoyo, "Accounting-based Digital Payment Systems for SMEs," *Proc. - Int. Conf. Comput. Inf. Sci. Sustain. Tomorrow with Digit. Innov. ICCOINS 2021*, pp. 226–229, Jul. 2021.
- [6] D. Livingstone and J. Kemp, "Putting a Second Life 'Metaverse' Skin on Learning Management Systems," in *Proceedings of the Second Life Education Workshop at the Second Life Community Convention*, 2006, pp. 13–18.
- [7] P. 'asher' Rospigliosi, "Metaverse or Simulacra? Roblox, Minecraft, Meta and the Turn to Virtual Reality for Education, Socialisation and Work," *Interact. Learn. Environ.*, vol. 30, no. 1, pp. 1–3, 2022.
- [8] Y. Alimzhanov, A. Absadyk, and O. Turar, "Leveraging Real-Time Simulation and Collaboration Platform for Project-Based Learning: Case Study of Astana IT University," in *2021 IEEE International Conference on Engineering, Technology & Education (TALE)*, 2021, pp. 1130–1134.
- [9] S. Melnik, M. Magnotti, C. Butts, C. Putman, and F. Aqlan, "A concept relationship map for industry 4.0," *Proc. Int. Conf. Ind. Eng. Oper. Manag.*, no. August, pp. 3435–3448, 2020.
- [10] C. Li, "Real-Time 3D Reconstruction of Dynamic Scenes," The University of Texas, 2020.
- [11] H. Ning *et al.*, "A Survey on Metaverse: the State-of-the-art, Technologies, Applications, and Challenges," 2021.
- [12] A. Fischer, "Architecture as Art in Metaverse," 2022.
- [13] L. Erickson, "Building the Metaverse with Open Source," *OpenSource.com*, 2022.
- [14] J. R. Williamson, J. Li, and V. Vinayagamoorthy, "Proxemics and social interactions in an instrumented virtual realityworkshop," *Conf. Hum. Factors Comput. Syst. - Proc.*, 2021.
- [15] D. A. Le, B. MacIntyre, and J. Outlaw, "Enhancing the Experience of Virtual Conferences in Social Virtual Environments," *Proc. - 2020 IEEE Conf. Virtual Real. 3D User Interfaces, VRW 2020*, pp. 485–494, 2020.
- [16] M. Chase, "The Metaverse Librarian: Building 3D Virtual Reality Learning Environments with Mozilla Spoke," in *Lifelong Information Literacy (LILI)*, 2022.
- [17] T. Eriksson, "Failure and success in using mozilla hubs for online teaching in a movie production course," *Proc. 2021 7th Int. Conf. Immersive Learn. Res. Network, iLRN 2021*, May 2021.
- [18] R. Brown *et al.*, "Employing Mozilla Hubs as an Alternative Tool for Student Outreach: A Design Challenge Use Case," in *New Realities, Mobile Systems and Applications*, 2022, pp. 213–222.
- [19] M. Kineta, R. Sanjaya, T. D. Hastuti, and F. Koeswoyo, *Pembuatan*

- Ruang Metaverse Menggunakan Blender (Creating a Metaverse Room Using Blender)*. Semarang, Indonesia: SIEGA Publisher, 2022.
- [20] Y. Sun, G. Albeaino, M. Gheisari, and R. Eiris, "Online site visits using virtual collaborative spaces: A plan-reading activity on a digital building site," *Adv. Eng. Informatics*, vol. 53, p. 101667, Aug. 2022.
- [21] M. Kineta, R. Sanjaya, T. D. Hastuti, and F. Koeswoyo, *Pembuatan Asset dan Ruang Metaverse (Creating Assets and Metaverse Rooms)*. Semarang, Indonesia: SIEGA Publisher, 2022.