UX Design of Augmented Reality-Based AT using Design Thinking Approach

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Abstract: Agrotourism(AT) is currently being advanced by technological innovation, which provides visitors with unprecedented immersive and instructive experiences. However, the rigorous application of user-centric design principles is crucial to such applications' success.

The multidisciplinary approach of incorporating Design Thinking ideas into the UX design of AR-based Agro-Tourism applications is explored in this paper. The aimed of the research is to identify creative solutions and user-centered design approaches using a combination of user research, empathy-building, problem characterization, ideation, prototyping, and iterative testing. By customizing the AR experience to the unique needs and preferences of tourists to agro-tourism sites, the research aimed to increase engagement, contentment, and the overall quality of the user experience.

The results of this study further illustrate the crucial function that Design Thinking performs in the creation of AR-based apps for the agrotourism industry. It gave developers, and other stakeholders useful information that they can use to make more engaging, educational, and user-friendly augmented reality (AR) experiences, thus raising the level of the agrotourism experience as a whole.

Keywords: Augmented Reality, Agro-Tourism, Eco-Tourism, User Experience, Design Thinking, System Usability Scale

1. Introduction

Agrotourism became increasingly significant in bridging the urban-rural divide, and its benefits—which included job creation, rural empowerment, agricultural productivity, sustainability, cultural preservation, and infrastructure development—were demonstrated [1]. These factors underlined the need for international support to ensure the industry's sustainability [2][3]. Agrotourism's growth in the Philippines increased income and ecological sustainability while diversifying farm activities [2]. Through farm camps and educational institutions, the government aggressively promoted it with the goal of inspiring future generations and advancing both tourism and agriculture on an economic and social level [4]. Unfavorable effects on society could be reduced, and sustainable practices could be advanced by encouraging relationships between stakeholders and embracing agritourism innovation [1], [5]. In conclusion, agrotourism played a critical role in bridging urban and rural communities, providing a wealth of benefits and the possibility for sustainable growth of the economy and the preservation of cultural legacy, especially in developing nations[1].

Augmented Reality (AR) technology integration transformed many industries recently, improving user experiences and providing creative answers to pressing problems. Agrotourism was one of those industries that AR was expected to help [6]. Urban residents had a rare opportunity to engage with rural life, learn about farming methods, and develop a greater understanding of food production through agro-tourism, the fusion of agriculture and tourism. However, user experience (UX) design concepts had to be applied to maximize the potential of agrotourism and meet the changing demands and expectations of contemporary consumers [7].

Augmented Reality (AR) was a transformative force in the changing landscape of agriculture and agrotourism. By seamlessly blending digital elements with the real world, AR enhanced our understanding of the environment and could make agrotourism experiences engaging and unforgettable[8][9]. This versatile tool improved tourists' explorations, added value, and personalized services to meet their unique preferences. Additionally, AR applications introduced lesser-known regions as attractive tourism destinations, contributing to economic growth and regional identity[10][11]. The compatibility of AR applications with smartphones, including Android devices, enhanced accessibility for users[12][13].

In order for AR applications to be successful, UX design was essential. It included factors of user happiness, usability, and general interaction quality[14][15]. The goal of AR-driven UX design was to produce intuitive, entertaining, and user-centered experiences. Designing augmented reality applications had to take into account user-centeredness, new digital touchpoints, and feedback. Emotional involvement

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was one of the finest practices that gave users satisfying experiences, according to a study[16][17][14].

The use of AR into agrotourism had the potential to advance environmental consciousness and sustainability. Agrotourism became increasingly concerned with sustainability, with an emphasis on protecting natural landscapes and supporting sustainable farming[18][19]. It could visually highlight the influence of agricultural operations on ecosystems.

Although augmented reality (AR) had a lot of potential, it also had several drawbacks, such as technical limitations, financial limits, and assuring smooth interaction with the real world[9][20][8][21][22]. It was difficult to create AR experiences that appealed to a broad audience with various levels of tech knowledge.

This study explored the UX design of AR-based agrotourism using the effective Design Thinking paradigm for solving problems. By integrating the tourists' wants and preferences into the design process, design thinking promised to unleash new aspects of agrotourism experience[23]. AR technology could immerse agro-tourists in engaging, educational, and amusing encounters by seamlessly fusing the physical and digital worlds, providing a link between urban and rural settings.

The future of AR-based agro-tourism was quite promising in that era of sustainable tourism, where authenticity and education were highly appreciated. This research used the concepts of design thinking to create creative and inclusive solutions in order to better understand the specific difficulties, possibilities, and user expectations related to this developing subject[4]. Insights that would improve the visitor experience as well as aid in the sustainability and expansion of agro-tourism were what we aimed to learn as we explored deeper into the intersections of agriculture, tourism, and technology. This would eventually benefit both rural communities and urban tourists [18].

The AR-Based Agro-Tourism app was essential in showcasing Agro-tourism in Apayao, guaranteeing that tourists had an exciting and educational experience during their stay in the province. The Agguimangan Agro-Eco Tourism Farm, the focal center of the app, which was rooted in Isnag tradition and gave tourists the chance to experience warm local hospitality and delightful Apayao-only cuisine, was prominently featured in the app. It is without a doubt that using the innovative app, particularly at Agguimangan Agro-Eco Tourism Farm, provided tourists with an exceptional opportunity to delve deeply into the captivating experiences and environmental wonders available, allowing them to gain in-depth knowledge and truly immerse themselves in the surroundings. Apayao was the last remaining natural frontier in the Cordilleras, home to friendly Yyapayaos and stunning scenery.

The AR-Based Agro-tourism app's main goal was to assist sustainable living, healthy local economies, and ecologically conscious lives while simultaneously promoting tourism. The aim of the app was to create a positive impact by offering users a delightful, enlightening, and unforgettable experience. In order to do this, the province of Apayao had to raise the public's awareness of the benefits of ecotourism, which would, in turn, encourage tourists to adopt eco-friendly lifestyles and support environmental protection.

In conclusion, the literature showed an increasing interest in the connection between agrotourism and augmented reality, demonstrating the potential of augmented reality to improve visitor experiences, raise awareness of agriculture, and encourage sustainability[24][25]. UX design emerged as a key element in creating meaningful and user-centric AR-based agro-tourism experiences, led by the concepts of Design Thinking. By examining how UX design might enhance AR applications for agro-tourism, this project aimed to make a contribution to this developing subject and develop immersive, educational, and entertaining experiences that benefited both tourists and the agricultural communities they visited[26][17].

2. Materials and Methods

Design Thinking

This study applied the design thinking methodology to unveil the preferred features and functionalities of the AR-Based Agro-Tourism application of the Agguimangan Agro-Eco Tourism Farm. Design thinking, a problem-solving approach centered on the user, was employed for its ability to generate innovative solutions aligned closely with user requirements [27][8] [28][21]. The design thinking method involved five distinct steps, including (a) empathy, which involved understanding the needs of the users. The researcher conducted direct observations by visiting the Agguimangan Agro-Eco Tourism Farm, observed the operation and flow of the farm, and engaged in casual conversations and informal interviews with the personnel and management of the farm. (b) Defined—describing the user's needs, desires, or problems for the ideate step. At this stage, the issues and difficulties the farm owners confronted were identified, serving as the basis for creating a UX design prototype. (c) Ideated—used brainstorming to come up with original and inventive techniques to explore potential solutions to the users' problems. At this stage, the researcher formulated the plotting of problems and solutions. As a result of the ideation step, (d) the prototype involved transforming the results of ideation into a tangible product or interface; thus, the researcher designed a rough model of the AR-Based Agro-Tourism application. (e) Testing required presenting the prototype to the users. The researcher conducted testing with the farm owner, management, and some tourists, gathering their input. At this stage, the prototype underwent

usability testing.

Fig. 1. Stages in the Design Thinking Method (Dam Friis & Siang Yu, 2020)

Data Collection

The selected data collection method was a semi-structured interview. In semi-structured interviews, there was a predefined list of questions to guide the discussion, but the interviewer had the flexibility to adapt the sequence or omit questions based on the interview's context. Additional questions were required to delve into the research question and objectives within specific organizational settings [27]. The interview process unfolded in two phases, aligning with the stages of the design thinking approach. The first phase occurred during the Empathize stage, and the second phase was scheduled for the Testing stage. The entire process adhered to an interview design established by the researcher.

3. Result and Discussion

Implementation of the Design Thinking Method

The application of the design thinking method to the development of the AR-Based Agro Tourism Application was demonstrated in stages, which can be explained as follows.

Empathy

The researcher gained insight into the challenges and issues faced by the farm owners in running their operation by conducting on-site visits and engaging in informal interviews and natural conservations with the farm owner and management. Based on table 1, several farm owners and the management encountered in the operation of agro-tourism.

Table 1. Problems in the operation of Agro-Tourism

	Challenges/Issues
1	Seasonality. Agrotourism frequently has peak seasons, when the number of visitors is highest.
2	Marketing and Promotion. It can be difficult to get people to come to the farm. Reaching the target audience and standing out in a crowded market require effective marketing and promotion.
3	Infrastructure and facilities required for tourists, such as parking, restrooms, and lodging, can be expensive to provide and require constant upkeep.
4	Community Relation. The presence of agro-tourism farms can have an influence on the local community,

and it is crucial to nurture relationships with neighbors and effectively address any potential concerns to uphold a positive reputation.

5	Competition. Agrotourism farms compete with other tourist destinations that could provide comparable experiences.
6	Diversification. Expanding the range of products that customers and visitors can purchase.
7	Support of LGU and other stakeholders. The farm could encounter challenges in effectively promoting itself if it doesn't receive support from the LGU and other collaborators. Insufficient promotion may result in limited visibility, attracting fewer tourists and visitors.

Define

At this stage the aim is to define and formulate the challenges and problems experienced by the farm owners and management in the operation of the agro-tourism. Table 1 summarized the challenges and problems encountered by the farm owner and the management.

Table 1. Ideas and Solutions

	AR Solutions
1	Seasonality. Develop an AR app that offers virtual farm tours. Visitors can explore the farm and its activities in a virtual environment, making it accessible year-round..
2	Marketing and Promotion. Create an AR marketing campaign where potential visitors can use their smartphones to view 3D models of the farm and its offerings, providing an immersive preview of what to expect.
3	Infrastructure and facilities. Implement AR wayfinding and signage within the farm to guide visitors to various facilities and points of interest, reducing the need for physical signage.
4	Community Relation. Use AR to engage with the local community by presenting virtual events, meetings or sharing AR updates on the farm's practices and initiatives.
5	Competition. Creating unique and captivating AR experiences sets the farm apart, while collaborations with local businesses enhance the overall offering. Creating a unique and captivating AR experience sets the farm apart.
6	Diversification. Create an AR-based online store where visitors can purchase farm products, merchandise, or virtual farm experiences.

Support of LGU and other stakeholders. Successful engagement with LGUs and stakeholders in AR-based agro-tourism farms involves effective communication, showcasing economic and community benefits, and aligning with local development priorities.

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Ideate

In this phase, it was time to propose solutions and innovative ideas to address the issues previously identified. These solutions were applied to the development of an AR-Based Agro Tourism application. This concept served as a foundational guide for creating prototypes that underwent user testing in the prototype phase. Figure 2 illustrated how the challenges and problems were linked to the suggested functionalities aimed at resolving them. Once the issues were identified and paired with potential solutions.

Fig 2. Mapping of Challenges/Issues to Proposed Functionalities
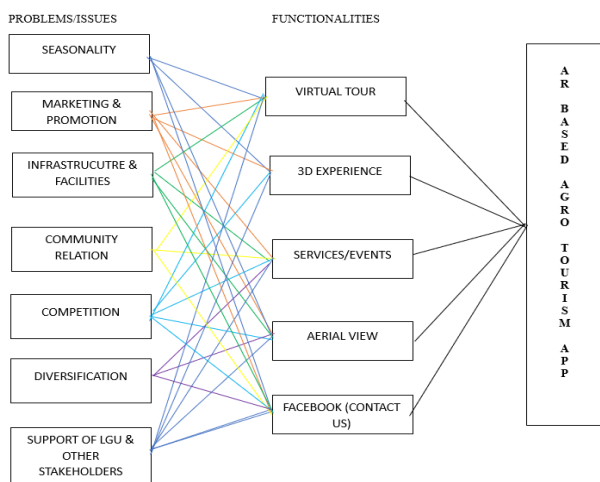
- Virtual Tour: This feature enables users to explore virtually Agguimangan Agro-Eco Tourism Farm on its surroundings, facilities and different farm locations.

- 3D Experience: An Augmented Reality (AR) based agro-tourism application's 3D Experience menu offers users a user interface to interact with and access 3D features and content. It offers various features to enhance the overall experience and serves as the central hub for navigating the augmented reality encounter.

- Services/Events: The purpose of this feature is to educate and direct people regarding the many services and activities offered at the farm. This feature highlights the goods and services that the farm has to offer. It improves visitors' overall agrotourism experiences by assisting them in trip planning, gaining access to pertinent information, and taking part in events.

- Aerial View: the aerial view functionality in an

AR-based agro-tourism app enhances user experience by providing a holistic perspective of the agro-tourism site, aiding in navigation, discovery, and information dissemination, and contributing to a more immersive and informative visit.

- Facebook Page (Contact Us): An AR-based agrotourism application's "Contact" features and link to its Facebook account of the farm is to give users a way to contact the farm's staff. It acts as a medium for communication, enabling users to make contact for any information or support regarding their visit, inquire about reservations, ask inquiries, request assistance, or ask questions.

Prototype

At this point, we implemented the previously learned principles by creating an AR-Based Agrotourism application that satisfies the needs of the farm's management and owner. This stage's ultimate objective was to develop an application that satisfied their requirements and successfully handled user complaints. The application was tested when it was finished to make sure it could meet these requirements and offer a solution.

Fig 3. The opening menu and Services menu of the AR-Based Agro-Eco Tourism Application
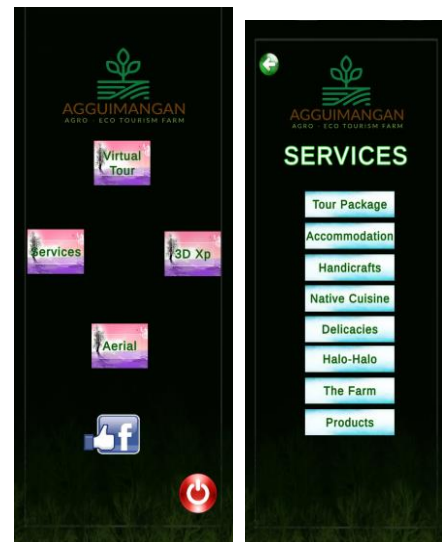

Fig 4. Some content of the Services on AR-Based Agro-Eco Tourism Application
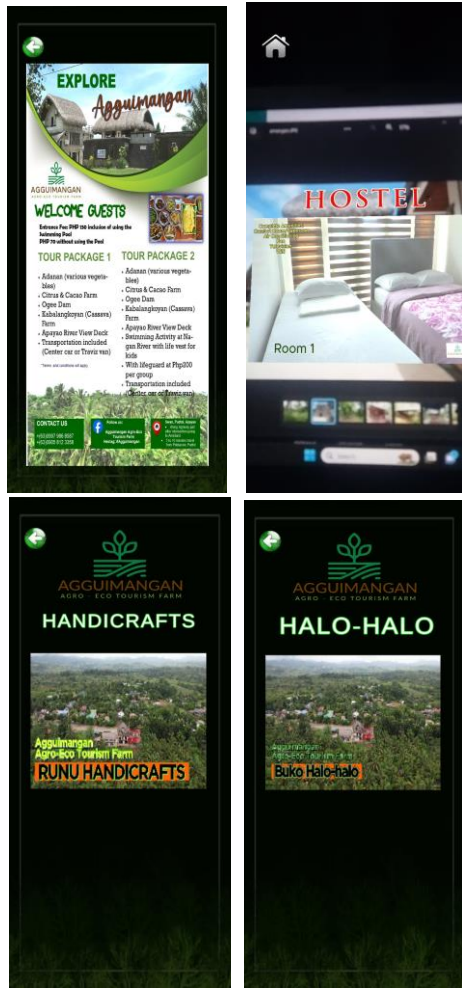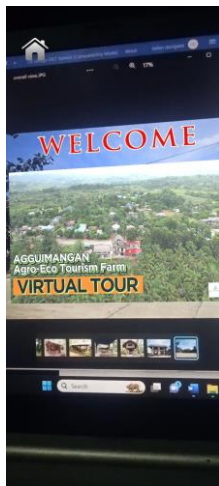
Fig 5. Virtual Tour of the AR-Based Agro-Eco Tourism Application

Test

The author tested the UI/UX design prototype's usability throughout this step. The System Usability Scale (SUS) method was selected as the testing approach. This is a useful instrument for assessing how user-friendly a product or program is [22][26]. Ten user statements were included in the questionnaire for the SUS method, which used a Likert scale to measure the data, with 1 denoting strong disagreement and 5 denoting strong agreement. Twenty people participated in the study, including potential

consumers like visitors as well as farm owners and employees. The scoring system used an original technique: the user's response was deducted from 5 for even-numbered items, and from 1 for odd-numbered things. This adjustment standardized all values between 0 and 4, with 4 indicating the most positive responses. The converted scores for each participant were then summed and multiplied by 2.5, effectively expanding the potential value range from 0 to 40 to a broader scale of 0 to 100 [29]. The results of the SUS test can be seen in Table 2 below.

Table 2. SUS Test Score Data

	Result Score											Value (Total X 2.5)
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	TOT	
R1	4	2	4	3	3	2	3	3	2	1	27	67.5
R2	4	1	3	2	3	2	4	2	4	2	27	67.5
R3	3	2	3	2	3	3	3	2	4	1	26	65
R4	3	2	3	1	4	2	3	3	3	1	25	62.5
R5	4	2	4	3	4	2	4	2	4	3	32	80
R6	2	2	2	2	2	2	2	2	2	2	20	50
R7	3	1	4	3	4	1	4	3	4	3	30	75
R8	4	2	4	2	4	2	4	2	4	3	31	77.5
R9	3	1	3	3	4	2	3	2	4	3	28	70
R10	4	2	4	2	4	2	4	1	4	3	30	75
R11	4	2	4	2	3	1	4	2	4	3	29	72.5
R12	4	1	4	2	3	1	3	2	3	1	24	60
R13	4	2	4	3	4	2	4	3	4	2	32	80
R14	4	2	4	3	4	2	4	2	3	1	29	72.5
R15	3	2	4	3	4	2	4	2	4	2	30	75
R16	4	2	4	3	3	2	4	3	4	2	31	77.5
R17	4	2	4	2	3	2	3	2	4	2	28	70
R18	4	2	4	2	3	3	3	2	2	2	27	67.5
R19	4	2	4	3	3	2	3	2	3	2	28	70
R20	4	2	3	2	3	2	2	2	4	2	26	65
						Average Score (Final Result)						70

Analyzing the data in Table 2, it was evident that the SUS rating received a score of 70. According to the evaluation criteria by Bangor et al. as illustrated in Figure 6, a score of 70 suggested that the app's usability was deemed acceptable, equivalent to a D+ grade or "good." This interpretation indicated that the application's design fell within a high marginal level of acceptability, demonstrating satisfactory user satisfaction [30][29].

Fig 6. SUS score interpretation (Bangor et. al)
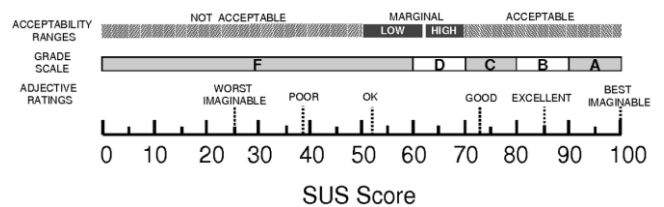
4. Conclusion

The main conclusion of the research emphasized the substantial contribution of applying Design Thinking to the development of AR-Based Agrotourism across various stages in shaping the application. The empathy stage served to identify user needs, while the define stage consolidated user problems and challenges. A comprehensive grasp of the issues was ensured by the involvement of the farm's owner

and management. The ideate stage facilitated the conceptualization of solutions to these issues, followed by the creation of a prototype in the prototype stage. Notably, the System Usability Scale (SUS) test results exhibited a significant enhancement in the UI/UX of the application, reflected in an average score of 70—indicating a level of acceptability. This outcome suggested that the design of AR-based Agrotourism apps could effectively elevate the user experience, addressing user needs and challenges.

Furthermore, by integrating technology with the needs of the users, the effective use of the design thinking methodology in this setting addressed significant problems that agro-tourism farms encountered. With its distinct scaling and modifications, the converted scoring system provided a thorough and consistent assessment, enabling a deeper comprehension of feedback from users.

Fundamentally, integrating Design Thinking into the UX design of AR-based agro-tourism not only enhanced the tourist experience but also nurtured creativity, diversity, and a seamless integration of technology across the tourism and agricultural sectors. The principles of Design Thinking served as a valuable compass for crafting immersive, user-friendly, and socially impactful experiences at the evolving intersection of tourism and agriculture. As we navigated the dynamic landscape of agro-tourism, these concepts provided guidance. The AR-Based Agrotourism app marked the pioneering use of a mobile application in the province.

Since this was the first mobile application dedicated to agro-tourism in the province of Apayao, the importance of AR-based agrotourism could not be overestimated. The province had made a progressive transition to the digital age with the adoption of such cutting-edge technology, which also created new opportunities for improving the traveler experience in general. This innovative project had the potential to transform the marketing of regional agricultural attractions, captivate visitors through immersive and interactive experiences, and establish Apayao as a cutting-edge travel destination. The AR-Based Agrotourism App presented Apayao as a leader in utilizing augmented reality to highlight its distinctive agrotourism and fit in with the worldwide trend of utilizing technology in the tourism industry.

References

[1] B. DEMİREZEN, "Agro Tourism in Turkey," *Int. J. Heal. Manag. Tour.*, vol. 5, no. 1, pp. 64–75, 2020, doi: 10.31201/ijhmt.696185.

[2] R. S. Sumardi, M. Najib, A. S. B. Mahomed, D. Dardanella, and R. Sneesl, *Factors Affecting Sustainable Agro-tourism: A Review Study*, vol. 2. Atlantis Press International BV, 2023.

[3] S. Rauniyar, M. K. Awasthi, S. Kapoor, and A. K. Mishra, "Agritourism: structured literature review and bibliometric analysis," *Tour. Recreat. Res.*, vol. 46, no. 1, pp. 52–70, 2021, doi: 10.1080/02508281.2020.1753913.

[4] R. B. Salazar, "Design thinking as an effective method for problem - setting and needfinding for entrepreneurial teams addressing wicked problems," *J. Innov. Entrep.*, 2023, doi: 10.1186/s13731-023-00291-2.

[5] A. Lak and O. Khairabadi, "Leveraging Agritourism in Rural Areas in Developing Countries: The Case of Iran," *Front. Sustain. Cities*, vol. 4, no. July, 2022, doi: 10.3389/frsc.2022.863385.

[6] H. Mendoza, "Sustainable Practices and Challenges of Farm Destinations," *Int. J. Acad. Ind. Res.*, vol. 3, no. 2, pp. 1–22, 2022, doi: 10.53378/352889.

[7] Y. Arifin, T. Galih, and E. Barlian, "ScienceDirect ScienceDirect User Experience Metric for Augmented Reality Application : A User Experience Metric for Augmented Reality Application : A Review Review," *Procedia Comput. Sci.*, vol. 135, pp. 648–656, 2018, doi: 10.1016/j.procs.2018.08.221.

[8] I. Cibilić, V. Poslončec-Petrić, and K. Tominić, "Implementing Augmented reality in Tourism," *Proc. ICA*, vol. 4, 2021, doi: 10.5194/ica-proc-4-21-2021.

[9] P. Bhatt, K. Panchal, H. PATEL, and U. Rote, "Tourism Application Using Augmented Reality," *SSRN Electron. J.*, 2020, doi: 10.2139/ssrn.3568709.

[10] A. Anwar, C. A. Nalisa, H. Hendrawati, S. Safriadi, and M. Arhami, "Aceh's Historic Tourist Attractions: An Augmented Reality-Based Prototype of a Virtual Tour Application," *J. INFORMATICS Telecommun. Eng.*, vol. 5, no. 2, 2022, doi: 10.31289/jite.v5i2.6460.

[11] L. Fitriani, D. Destiani, and H. Muhtadillah, "A Tourism Introduction Application Using Augmented Reality," *J. Online Inform.*, vol. 7, no. 1, 2022, doi: 10.15575/join.v7i1.817.

[12] C. W. Pitos, "Android-Based Augmented Reality Tourist Guide Application," *IASPER Interdiscip. Res. J.*, vol. 12, no. July, pp. 30–40, 2020, [Online]. Available: https://orcid.org/0000-0002-4765-543X.

[13] C. C. Chiu, W. J. Wei, L. C. Lee, and J. C. Lu, "Augmented reality system for tourism using image-based recognition," *Microsyst. Technol.*, vol. 27, no. 4, 2021, doi: 10.1007/s00542-019-04600-2.

[14] W. S. L. Nasution and P. Nusa, "UI/UX Design Web-Based Learning Application Using Design Thinking Method," *ARRUS J. Eng. Technol.*, vol. 1, no. 1, pp. 18–27, 2021, doi: 10.35877/jetech532.

[15] M. Sandesara *et al.*, "Design and Experience of Mobile

Applications: A Pilot Survey," *Mathematics*, vol. 10, no. 14, pp. 1–20, 2022, doi: 10.3390/math10142380.

[16] C. Adhitya, R. Andreswari, and P. F. Alam, "Analysis and Design of UI and UX Web-Based Application in Maiproyek Startup Using User Centered Design Method in Information System Program of Telkom University," *IOP Conf. Ser. Mater. Sci. Eng.*, vol. 1077, no. 1, p. 012039, 2021, doi: 10.1088/1757-899x/1077/1/012039.

[17] I. Darmawan, M. S. Anwar, A. Rahmatulloh, and H. Sulastri, "Design Thinking Approach for User Interface Design and User Experience on Campus Academic Information Systems," *Int. J. Informatics Vis.*, vol. 6, no. 2, pp. 327–334, 2022, doi: 10.30630/joiv.6.2.997.

[18] E. Djuwendah, T. Karyani, E. Wulandari, and P. Pradono, "Community-Based Agro-Ecotourism Sustainability in West Java, Indonesia," *Sustain.*, vol. 15, no. 13, pp. 1–19, 2023, doi: 10.3390/su151310432.

[19] A. Puška, M. Nedeljković, M. Jeločnik, J. Subić, D. Nancu, and J. V. Andrei, "An assessment of improving the sustainable agro-touristic offer in an emerging country using the integrative approach based on fuzzy logic," *Front. Environ. Sci.*, vol. 10, no. October, pp. 1–17, 2022, doi: 10.3389/fenvs.2022.894811.

[20] D. R. Dela Cruz, J. S. A. Sevilla, J. W. D. San Gabriel, A. J. P. Dela Cruz, and S. C. Ella Joyce, "Design and Development of Augmented Reality (AR) Mobile Application for Malolos' Kameztizuhan (Malolos Heritage Town, Philippines)," *2018 IEEE Games, Entertain. Media Conf. GEM 2018*, no. August 2018, pp. 15–19, 2018, doi: 10.1109/GEM.2018.8516272.

[21] C. Zhao, Y. Yin, T. Jung, M. C. Dieck, and M. Y. Lee, "Mobile Augmented Reality Heritage Applications : Meeting the Needs of Heritage Tourists," pp. 1–18, 2021.

[22] G. Çalışkan and B. Sevim, "Augmented Reality Technologies From the Tourist Perspective: A Systematic Review," *J. Tour. Gastron. Stud.*, vol. 9, no. 3, 2021, doi: 10.21325/jotags.2021.851.

[23] A. Ramtohul, "An Engaging User Experience Framework for Mobile Augmented Reality," 2023.

[24] K. Yamagishi, C. Gantalao, and L. Ocampo, "The future of farm tourism in the Philippines: challenges, strategies and insights," *J. Tour. Futur.*, no. March, 2021, doi: 10.1108/JTF-06-2020-0101.

[25] L. M. Wahyuni, N. M. Sudarmini, S. Solihin, A. A. A. Mirah Kencanawati, and N. W. Sukartini, "Agro-Tourism Potential to Support Sustainable Tourism in Pancasari Village," *Int. J. Soc. Sci. Hum. Res.*, vol. 06, no. 04, pp. 2209–2215, 2023, doi: 10.47191/ijsshr/v6-i4-28.

[26] P. Sinlapanuntakul and J. Korentsides, "Exploring the user experience (UX) of a multi-window augmented reality environment," no. August, pp. 1–8, 2023, doi: 10.3389/frvir.2023.1194019.

[27] S. Khan and F. M. S. M, "Design thinking, Tourism and its application on Community based Ecotourism (CBE)," *Int. Res. J. Adv. Sci. Hub*, vol. 3, no. Special Issue 7S, pp. 144–157, 2021, doi: 10.47392/irjash.2021.224.

[28] Z. Sándorová, T. Repáňová, Z. Palenčíková, and N. Beták, "Design thinking - A revolutionary new approach in tourism education?," *J. Hosp. Leis. Sport Tour. Educ.*, vol. 26, no. January, p. 100238, 2020, doi: 10.1016/j.jhlste.2019.100238.

[29] J. R. Lewis and J. Sauro, "Item Benchmarks for the System Usability Scale," *J. Usability Stud.*, vol. 13, no. May 2018, pp. 158–167, 2018.

[30] J. Brooke, "SUS: A 'Quick and Dirty' Usability Scale," *Usability Eval. Ind.*, pp. 207–212, 2020, doi: 10.1201/9781498710411-35.