

RESEARCH ARTICLE



Evaluation of Visitor Loyalty to Technology-Based Attractions for Sustainable Tourism at Taman Safari Indonesia after COVID-19

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ABSTRACT

Taman Safari Indonesia (TSI) is an organization dedicated to ex-situ conservation. The pandemic caused a 53% decline in visitor visits to TSI in 2020 compared to 2019, creating an urgent need for funds to ensure the institution's sustainability. In response, various technology-based visitor attractions have been developed, focusing on Augmented Reality (AR) applications to enhance both the quantity and quality of visitor experiences. This study examines how visitors' experiences with technology-driven attractions influence their satisfaction and loyalty to TSI. The SEM-PLS method was used to analyze data using structural equation modeling. After using the AR features, they completed a questionnaire based on their impressions of AR-based visitors' attractions. The results showed that the relationship between satisfaction and loyalty was significant, with a path coefficient of 3.760, greater than the t-table value of 1.96 at a 95% confidence level, indicating statistical significance. The findings suggest that higher satisfaction levels lead to greater visitor loyalty, with satisfied visitors more likely to return to TSI, especially with the enhanced AR experience. Visitors' interactions with AR features improved their overall experience and strengthened their emotional connection to the TSI, suggesting the potential for sustained engagement. These results imply that integrating advanced technologies such as AR can play a key role in fostering visitor loyalty. Future tourism strategies should integrate immersive AR experiences with ecological education and conservation efforts to promote environmental sustainability.

Introduction

The COVID-19 pandemic affected the entire world in 2020, prompting the implementation of travel restrictions to prevent the spread of the virus, particularly owing to the movement of people across borders [1–5]. Given COVID-19's highly contagious nature, all human-to-human interactions have been restricted [6–8]. In particular, the tourism industry is severely affected by these measures [9]. One such organization was Taman Safari Indonesia (TSI), a conservation institution established under Decree No. 709/Kpts-II/90, dated December 6, 1990, updated by Decree No. 242/Kpts-II/1999 of the Ministry of Forestry. The TSI serves as an eco-friendly breeding facility for animals outside their natural habitats and is dedicated to their protection.

In 2020, the number of visitors to TSI dropped by 53% compared to 2019, mainly because of the pandemic and the resulting travel restrictions. Consequently, TSI faced a significant financial challenge as it urgently required revenue to cover the costs of animal care and feeding. Developing diverse and engaging visitor

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attractions is essential to ensure TSI's continued operation and to encourage post-pandemic tourism. According to Saway et al. [10], offering more exciting and varied attractions increases visitor satisfaction, which helps ensure the long-term sustainability of these attractions. Adapting and innovating during and after a pandemic is vital for the recovery of the tourism sector [1]. One promising approach is to integrate technology, specifically Augmented Reality (AR), into the visitor experience [11]. AR technology can help maintain safe distances between visitors [12]. As defined in Copra and Gupta [13], AR is a technology-based application that blends real-world surroundings with real-time virtual environments using mobile devices.

Keckes and Tomicic [14] suggests that AR has the potential to enhance visitors' experiences by providing relevant information and expanding their understanding of visitors' sites and enjoyment. According to Chung et al. [15], research was conducted in the 2013 Deoksugung Palace in Korea using the partial least squares (PLS) method with 145 respondents. The results of the study show that satisfaction with AR has a significant positive impact on destination attitudes, with a t-statistic of 11.951. In the study by Han et al. [16], participants who experienced AR services during cultural heritage tours were randomly recruited from Amazon Mechanical Turk. A total of 355 respondents were analyzed using structural equation modeling with partial least squares (SEM-PLS). Satisfaction with AR also had a significant positive impact on the desire to support the conservation of heritage destinations ($t=3.783$). AR technology in heritage tourism is acknowledged as an innovative approach that enhances the quality of visitors' experiences, aids practitioners in establishing a competitive advantage for destinations, and improves relationships between tourists and destinations. Thus, the ultimate goal of AR development is to maintain and preserve tourist destinations by providing better experiences at cultural heritage sites. The application of AR in tourism has been shown to improve travel and leisure experiences [13]. This aligns with the findings of a 2019 study by Han et al. [17], which focused on the cultural tourism sector, specifically art galleries in England. However, studies examining AR user experiences in the travel and tourism industries remain limited [18] especially for dynamic objects such as animals.

Understanding visitor satisfaction and loyalty is critical for the sustainable growth of tourism destinations. This study not only highlights the importance of health and safety but also accelerates the integration of technology into the tourism experience. As tourism destinations strive to grow sustainably, it is important to understand how attractions impact visitor satisfaction and loyalty [19]. Such innovations offer new ways of engaging visitors while adhering to social distancing measures. The intersection of technological innovation and environmental sustainability is also important, as attractions aim to create memorable experiences while minimizing their ecological impact. In addition, TSI is unique because tourists can interact by feeding on animals such as deer, zebras, hippos, and others. Therefore, this study aims to analyze how visitor satisfaction and loyalty are shaped by their experiences with AR-based attractions in TSI.

Materials and Methods

Study Area

This study was conducted at TSI, which has an area of 200 ha. TSI coordinates were 6°43'13"S 106°57'02"E–6.7203156°S 106.9505096°E, located in Cibeureum Village, Cisarua District, Bogor Regency, West Java, Indonesia (Figure 1). The TSI area borders Gunung Gede Pangrango National Park to the south, Citeko to the west, Tugu Village to the east, and Cibeureum Village to the north. This study was conducted between January and May 2023. Data were collected from May 16 to 21, 2023, at Taman Safari Indonesia, Bogor.

Data Collection

Development of the AR Application

The AR application was developed at the ITB School of the Business Management Laboratory. This application was designed to enhance the visitor experience at Taman Safari Indonesia (TSI) using Augmented Reality technology. The AR attraction application can be used by pressing the marking button based on the coordinate points entered into the cell phone. It obtains information about several prototype animals, such as Elephants, Zebras, and Camels. Information such as animal names, feed, animal distribution, and the level of animal rarity will also appear.

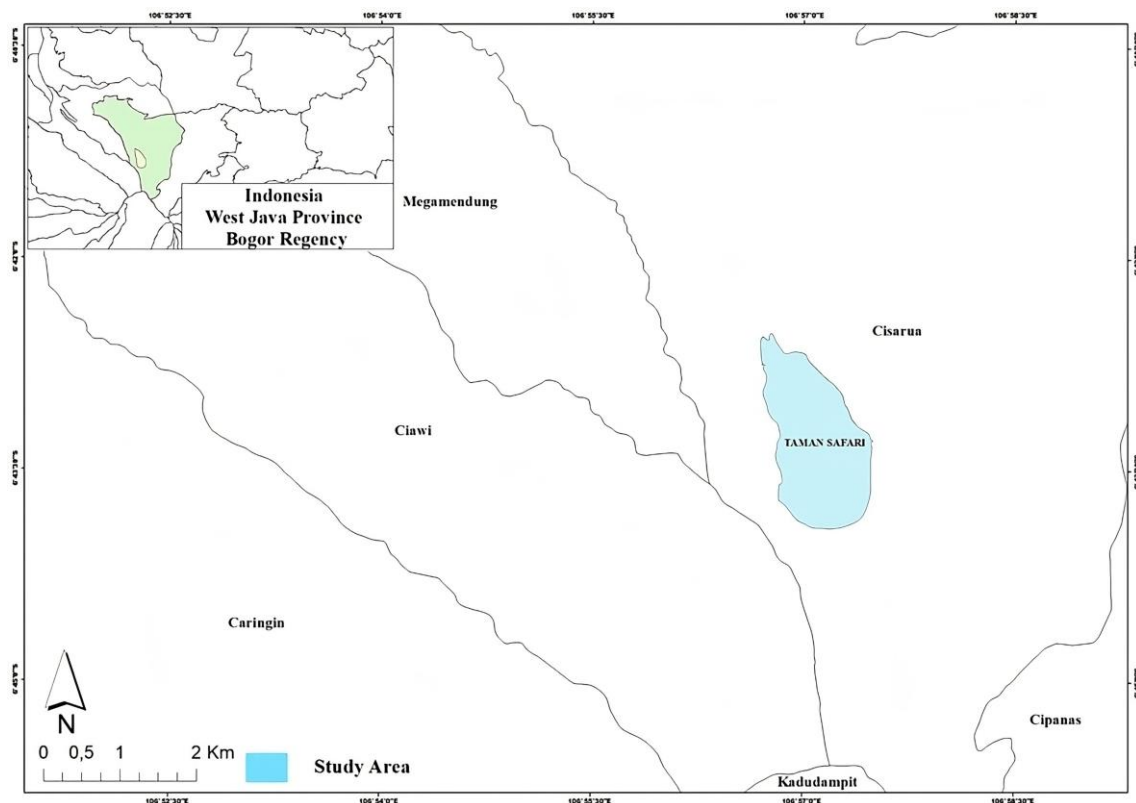


Figure 1. Maps of AR site at TSI located in Cibeureum Village, Cisarua District, Bogor Regency.

Testing the AR Application

After the AR application was finalized, it underwent testing with participants in 2023 (Figure 2). This application operates on coordinate positions and allows for a maximum interaction range of 10 meters between the Android device and the animal. It is designed to ensure the well-being and comfort of visitors.

After using the AR application, respondents were asked to complete a questionnaire based on their experience with the AR visitors' attraction. The questionnaire was designed to assess satisfaction with and loyalty to AR applications. In the SEM-PLS analysis, the questionnaire was not validated first. Invalid variables were deleted when applied to SEM-PLS software. The questionnaire consists of two parts. Part 1: demographic information, including sex, age, education level, and income, and Part 2: questions about AR applications, specifically their content, handling, satisfaction, and loyalty. Each of these four categories contained three questions for a total of 12 to determine their usefulness (see Table 1). The questionnaire used a 4-point Likert scale [20], ranging from 1 (strongly disagree) to 4 (strongly agree) to prevent neutral or doubtful responses. A Likert scale was used to quantify visitor satisfaction with and loyalty to the AR experience. Visitor satisfaction and loyalty data were collected through field observations and interviews conducted at the TSI.



Figure 2. Visitors' experience of AR attractions at TSI.

Sampling and Respondent Selection

A random sampling method was used to select 384 visitors over one-week period in May 2023. Respondents were required to have visited the TSI at least once to ensure that they were familiar with the attraction. The sample size was determined using the Cochran formula [20] based on the average number of visitors visiting the TSI from 2015 to 2022.

$$n = \frac{t^2 \cdot p \cdot q}{1 + \frac{1}{N} \left(\frac{t^2 \cdot p \cdot q}{d^2} - 1 \right)} \quad (1)$$

Where n is sample size, N is population size (10,694,032), t is desired confidence level (95%, so that t value = 1.96), d is error rate (used 0.05), p is proportion, q is 1–p and 1 is constant number.

According to the Indonesian Dictionary, loyalty refers to obedience and fidelity. It can also be understood as a person's commitment or allegiance to an individual, group, or organization. In the context of Taman Safari Indonesia (TSI), loyalty is defined as the willingness to revisit, that is, the intention of visitors to return for another visit and recommend the AR attraction to friends and family, highlighting its appeal and value.

Table 1. Variables and indicators model used in the AR application study on visitor satisfaction and loyalty at TSI.

Variable	Indicators	Information	Source
Content	A1	Enjoy AR applications and interesting content	[21]
	A2	Engage in the use of AR applications	[21]
	A3	Comfortable using AR applications	[21]
Handling	B1	The quality of the visual display/images of the application	[22,23]
	B2	Conformity of visual appearance/image with reality	[22]
	B3	The sound display is clear and like reality	[22]
Satisfaction	C1	Using AR applications is a valuable experience	[24]
	C2	Using AR applications is an activity that exceeds expectations	[24]
	C3	Using AR applications is a satisfying experience	[24]
Loyalty	D1	The application provided increases visitors' knowledge about animals	[23,24]
	D2	You will revisit Safari Park using the AR application and tell your friends about it	[22]
	D3	The application provided is not complicated	[22]

Data Analysis

Figure 3 shows that the variables in the model were content (A1, A2, A3), handling (B1, B2, B3), satisfaction (C1, C2, C3), and loyalty (D1, D2, D3). Table 1 presents the variables and indicators used in this model. Data were analysed using Structural Equation Modelling (SEM) 3.0 software [25–27]. PLS-SEM does not require nominal, ordinal, or continuous measurement scales. The data does not have to be normally distributed, and it is more efficient for the results to be obtained in one run. In this study, testing was performed using the created model.

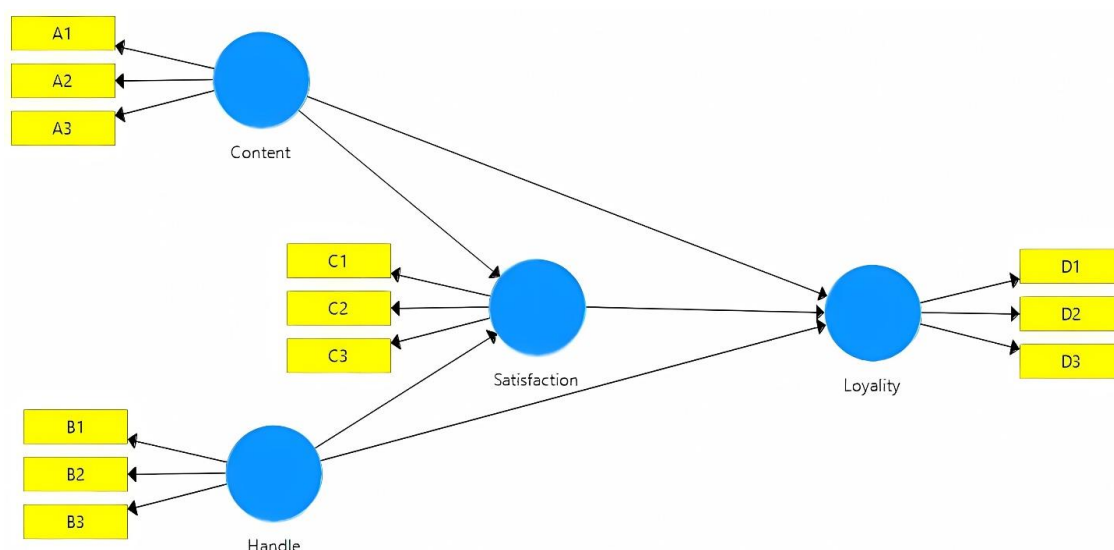


Figure 3. Research model on the use of AR applications on visitor satisfaction and loyalty at TSI.

Composite Reliability and Average Variance Extracted (AVE) analyses were conducted to determine the validity and reliability of the questionnaire, ensuring that the measurement instruments used in the study were consistent and accurate. According to Hair et al. [25] and Sulistiowati et al. [28] indicate that the Composite Reliability value exceeds 0.7, signifying a high degree of internal consistency among the items. In contrast, the AVE value exceeds 0.5, indicating that the constructs account for an adequate portion of the variance from the observed variables. These thresholds confirm that the questionnaire met the established criteria for construct validity. Significance analysis was performed through bootstrapping techniques using PLS-SEM software, which enabled testing of model robustness and hypothesis validation. With a confidence level of 95% ($\alpha=5\%$), t-statistics were calculated with a minimum threshold of 1.96 [25], ensuring statistical reliability. These methods provide a rigorous framework for evaluating the structural model and the relationships between variables, ultimately supporting the credibility and generalizability of the study's findings.

Results and Discussion

Results

The Demographic Characteristics of the Respondents

AR users are typically categorized based on their sex, age, and educational attainment. This is because younger generations are often quicker to embrace new technologies than older generations due to their greater adaptability to technological advancements. With a growing student population, the tourism industry holds significant growth potential for young travellers, especially during and after the pandemic [29]. Education, which includes both formal and informal learning experiences inside and outside school, is a lifelong process aimed at optimizing individual capabilities [30].

Visitors to Taman Safari Indonesia (TSI) come from diverse age groups, genders, and educational backgrounds, resulting in varied experiences with technology-based attractions (Table 2). The results revealed that out of 206 respondents, 53.65% were male, with the majority of visitors to Taman Safari Indonesia (TSI) falling within the 20–40 years age range. This age group is characterized by a preference for attractions that blend fun and challenging experiences, making TSI an appealing destination. Furthermore, many visitors in this demographic are young parents bringing their children on vacation, reinforcing TSI's status as a popular choice for young families seeking education and entertainment in a natural setting. In addition to its established offerings, the growth in visitors aged 20–40 presents an opportunity to explore technology-driven tourism innovations, such as Augmented Reality (AR). These advancements can create immersive, personalized experiences that resonate with tech-savvy younger generations. By integrating such modern features, TSI can enhance its appeal and position itself as a cutting-edge destination.

The dominance of this productive age segment among TSI visitors offers strategic advantages for the destination's sustainability. This demographic is not only a key driver of footfall but also represents a significant opportunity for long-term engagement. By catering to their preferences, TSI can continue to evolve as a family-friendly attraction that prioritizes nature conservation while delivering memorable, high-quality experiences.

Table 2. Demographic characteristics of respondents used in the AR application study on visitor satisfaction and loyalty at TSI.

Characteristics	Parameter	Frequency	(%)
Gender	Male	206	53.65
	Female	178	46.35
Age	Under 20 years	93	24.22
	20–40 years	234	60.94
	41–60 years	55	14.32
	Over 61 years	2	0.52
Marital status	Not married yet	248	64.58
	Married	136	35.42

Characteristics	Parameter	Frequency	(%)
Origin	Jabodetabek	332	86.46
	Outside Jabodetabek	27	7.03
	Outside of Java Island	25	6.51
Education	Less than high school	15	3.90
	High school graduate	252	65.63
	Bachelor's degree	104	27.08
	Master's or Doctoral degree	13	3.39
Employment	Student	180	46.88
	Government officer/state-owned enterprises/employees	125	32.55
	Entrepreneur	77	20.05
	TNI/police	2	0.52
Income	<Rp500,000	130	33.85
	Rp500,000–Rp1,000,000	23	5.99
	Rp1,100,000–Rp3,000,000	153	39.84
	Rp3,100,000–Rp5,000,000	43	11.20
	Rp5,000,001 or more	35	9.11

In the long term, these efforts reinforce TSI's image as a forward-thinking, family-oriented destination that balances economic sustainability with ecological responsibility. By staying attuned to visitor needs and leveraging technological innovations, TSI can solidify its position as a leader in sustainable tourism while continuing to inspire and educate future generations. Most of the visitors to Taman Safari Indonesia (TSI) came from the Greater Jakarta area (Jabodetabek), which includes Jakarta, Bogor, Depok, Tangerang, and Bekasi, accounting for 86.46% of the total visitors.

Analysis of Visitor Satisfaction and Loyalty Using AR Applications

This study examines a model designed to assess visitor satisfaction and loyalty. The results showed that factors A1, A2, A3, B1, B2, C1, C3, D1, and D2 had factor loadings greater than 0.5, whereas factors B3, C2, and D3 had loadings below 0.5. According to Putri and Silitonga [31], any factor with a loading value below 0.5 should be removed from the model, while factors above 0.5 are considered valid. Consequently, factors B3, C2, and D3 were excluded from the model because they were insufficient for measuring the latent variables (Table 3). This shows that to ensure a valid and reliable model, only indicators that significantly contribute to explaining latent variables can be retained. The process of refining indicators is important to make the model more representative.

Table 3. Outer loadings used in the AR application research model on visitor satisfaction and loyalty at TSI.

	Content	Handle	Satisfaction	Loyalty
A1	0.668			
A2	0.667			
A3	0.804			
B1		0.923		
B2		0.946		
C1			0.790	
C3			0.916	
D1				0.834
D2				0.752

Indicator B3 relating to animal sounds has a value below 0.5, which reflects that animal sounds in the Augmented Reality (AR) application have not met user expectations. Respondents considered that the animal sounds in the application were not realistic or in accordance with reality. The implication is that app development should focus on improving audio elements that are more authentic and discrete, such as ensuring that the voices of tigers, elephants, or other animals in the app match their original characteristics. This can improve user satisfaction as well as the perceived quality of the app.

Some respondents who were not familiar with AR apps pointed out the need to introduce this technology more inclusively to new users. This includes a more user-friendly interface design as well as the provision of tutorials or guides for using the app. These adaptations are important to minimize technological barriers, especially for tourists who are less familiar with technology-based attractions. The refinement of AR applications not only contributes to a better tourist experience but also supports innovation in the tourism sector. It can attract new visitor segments interested in modern technology experiences, increase visitation, and provide a positive economic impact.

The results showed that the Composite Reliability (CR) values were above 0.7, and the Average Variance Extracted (AVE) values were greater than 0.5. Therefore, it can be concluded that the model is both reliable and valid (Table 4). According to Hair et al. [25], Badi and Khan [26], Sulistiowati et al. [28], if the Composite Reliability value exceeds 0.7, the construct demonstrates good reliability; if the AVE value exceeds 0.5, the indicator exhibits good convergent validity.

Table 4. Construct reliability and validity used in the AR application research model on visitor satisfaction and loyalty at TSI.

	Composite Reliability	Average Variance Extracted (AVE)
Content	0.758	0.512
Handle	0.932	0.873
Satisfaction	0.844	0.731
Loyalty	0.773	0.630

Figure 4 presents the findings of this study. With a statistical t-value of 13.601, the results show that 66% of the 252 respondents strongly agreed that they appreciated the AR application (A1). For A2, 49% of the respondents, corresponding to a t-value of 13.895, reported feeling engaged in the activities and expressed that they might use the application to learn about animals. The app provided detailed information about each animal's name, diet, and rarity, which helped respondents feel that their understanding of the protected animals was enhanced. Protecting these uncommon species is crucial to extending their lifespan. To support the sustainability of rare and endemic species, the TSI (as a conservation organization) may assist the government in encouraging public participation in preservation efforts. This could lead to more visitors returning to the TSI, specifically those interested in using the AR application. An increased interest in visitors would, in turn, benefit animal welfare.

Animals at TSI are among the primary attractions, and when combined with AR activities, they appear even more unique and captivating, offering visitors a diverse range of attractions. Travelers tend to prefer destinations with various types of attractions. Furthermore, the statistical t-value of 28.511 (A3) indicated that 57% of the respondents felt comfortable using the program and strongly agreed that it was user-friendly. Ease of use is essential for user satisfaction with AR applications. Additionally, the app's use supports the TSI's sustainability, as visitors need not worry about potential infections transferring between humans and animals. The AR attraction was enjoyable, comfortable, and genuinely engaged with the respondents. Technological innovation, especially AR, significantly impacts the travel and tourism industry by creating new experiences and enhancing satisfaction.

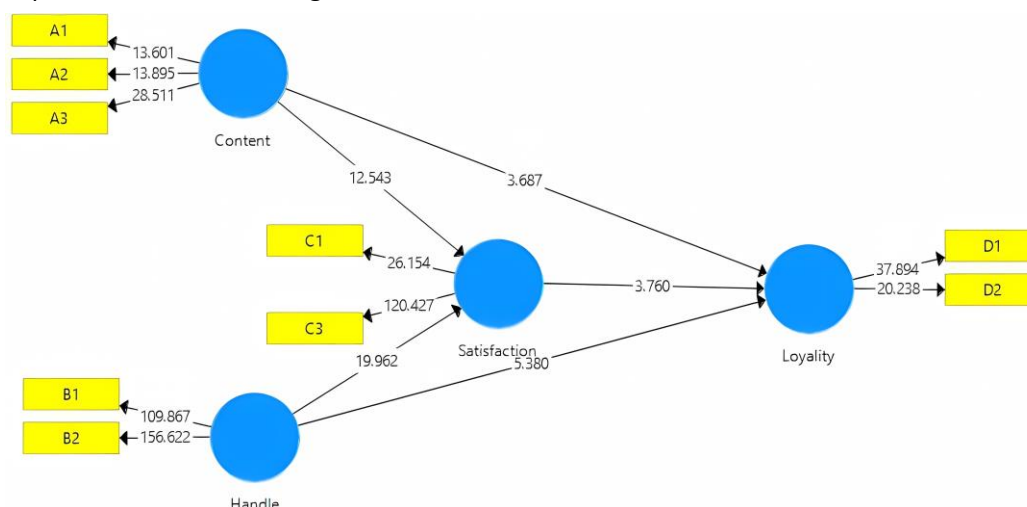


Figure 4. Final model outcomes following bootstrapping at TSI on visitor satisfaction and loyalty for AR applications.

According to “Handling’s research”, 229 respondents (60%) rated the application's display quality as excellent, with a t-value of 109.867 (B1), highlighting the application's strong visual appeal and ability to meet user expectations. Additionally, 207 respondents (54%) agreed that the visuals and images accurately reflected their experiences at TSI, with a t-value of 156.622 (B2), demonstrating the effectiveness of the application in replicating real-life experiences in a virtual environment. According to Saurik et al. [21], the quality of the imagery significantly influences satisfaction with the application, further emphasizing the critical role that high-quality visuals play in shaping user perceptions and overall satisfaction. These results suggest that focusing on enhancing image resolution, color accuracy, and immersive visual effects could further improve user engagement and foster a stronger sense of connection with TSI. By ensuring that the visual elements remain both authentic and captivating, the application can better support the TSI's mission to deliver an educational and enjoyable experience for its visitors, while simultaneously promoting its conservation goals.

The respondent satisfaction showed that 59% found the application beneficial, with a statistical t-value of 26.154 (C1), indicating a significant positive impact of the application on user experience. The ongoing development of AR applications is crucial to maintaining user satisfaction, enhancing functionality, and encouraging users to return to TSI, thereby ensuring a sustainable hybrid tourism model that aligns with environmental goals. Additionally, respondents found the AR experience to be highly gratifying, reflected by a t-value of 120.427 (C3), which underscores the critical role of immersive technologies in enhancing visitor engagement, perceived value, and willingness to recommend the experience to others. These findings highlight the importance of continuously refining AR features to meet user expectations, address potential technical issues, and further integrate educational elements that align with TSI's conservation and entertainment objectives.

The application tested on respondents was both engaging and valuable. It enhanced visitors’ knowledge about animals, with a t-value of 37.894 (D1), and 54% of respondents indicated that they would visit the TSI using the AR application and recommend it to friends (D2). Based on the results, the path value between satisfaction and loyalty was 3.760, exceeding the t-table threshold of 1.69 at a 95% confidence level, indicating statistically significant results (Table 5). As indicated in Hair et al. [25], the original sample's positive path value confirms that higher satisfaction leads to greater loyalty, thus increasing the likelihood of visitors returning to the TSI.

Table 5. Path coefficient values on visitor satisfaction and loyalty for AR applications.

	Original sample (O)	Standard deviation (STDEV)	t statistics (O/STDEV)	p values	Study result
Content -> Satisfaction	0.398	0.032	12.543	0.000	Significant
Content -> Loyalty	0.208	0.056	3.687	0.000	Significant
Handle -> Satisfaction	0.598	0.030	19.962	0.000	Significant
Handle -> Loyalty	0.321	0.060	5.380	0.000	Significant
Satisfaction -> Loyalty	0.284	0.076	3.760	0.000	Significant

Discussion

The results of the study showed a strong correlation between the frequency of repeat visits to Taman Safari Indonesia (TSI) and loyalty to technology-based tourism, especially the use of Augmented Reality (AR) features. The more often visitors return to Taman Safari Indonesia (TSI), the stronger their loyalty to technology-based tourism. Most of these visitors were male (53.65%), aged 20–40 years, and had a high school education (65.63%), who grew up with internet access and digital technology (Table 2). The 20–40 age group is the age group with Generation Z and Millennials, who are known to be tech and digitally literate, and relatively open to innovations such as AR. This demographic group is very likely to use AR tourism features, considering that the application is fun and interesting, because it offers new experiences and educational content, especially those that are relevant in the post-COVID-19 era.

High school graduates in this age range are generally active in popular digital culture, such as using TikTok, Instagram, YouTube, and AR-based games like Pokémon GO. The novelty of the AR experience also encourages visitors to share their experiences on social media, attracting a wider audience and driving interest and loyalty to the TSI. This influence is crucial for the growth of sustainable tourism in destinations such as Taman Safari, Indonesia. This is in accordance with research conducted by Khusaeni et al. [32], which shows that factors such as gender, destination attractiveness, accessibility, comfort, and ease of use have a

greater influence in shaping consumer behavior in visitors to tourist destinations in Tangerang Regency than education level.

Similar results were also reported by Bernini and Cracolici [33], and Tomić et al. [34], who concluded that demographic factors such as gender, age, education level, family structure, and income have a significant role in shaping consumer behavior and influencing visitor decisions of tourist destinations, but these findings are in contrast to research in Badung Regency, Bali [35] which showed that most visitors in the area, aged 19–24 years, with a bachelor's degree, were women. This is because the attractions provided in TSI are adventure attractions combined with the development of AR attractions, so that they are very popular with men. In general, men in this age group have a preference for activities that are exploratory, competitive, and visually interactive, such as video games, simulations, and adventure experiences.

The combination of education and entertainment forms the core of TSI's value proposition, uniquely aligning with the needs and desires of young travellers and families. This approach creates substantial opportunities for operational sustainability of TSIs. The increased visits from this demographic not only drive higher revenue streams but also enable continuous improvement in service quality. These additional resources can be strategically allocated toward initiatives such as procuring high-quality animal feed, maintaining and upgrading facilities, and developing impactful conservation programs that further underscore the TSI's commitment to environmental stewardship.

The success of AR technology in tourism relies on its ability to create engaging narratives, which are essential for fostering visitor loyalty and ensuring TSI's economic resilience. For developers and educators, understanding these factors is crucial when designing AR applications to encourage their adoption, especially in improving animal conservation education. This finding is in line with Sundoro and Wibawa [22], regarding technology-based learning media, the trial results using questionnaire analysis data from respondents indicate that this application is worthy of being used as a reference for learning activities, with an assessment of 77%. Meanwhile, for student learning motivation, the average value was 3.48 and was included in the good category.

Incorporating AR attractions into tourism environments can significantly boost visitor engagement and build customer loyalty. By blending physical and digital experiences, TSI visitors can form deeper emotional connections with attractions. The integration of AR redefines visitor expectations and behaviors, which are essential for fostering loyalty in the post-pandemic tourism landscape. AR attractions provide immersive, interactive experiences that enhance the visitor experience by bridging the gap between the digital and physical worlds. This technology also promotes safety and comfort, which is especially important given the ongoing health concerns after the pandemic.

Furthermore, the emotional connection fostered through unique AR storytelling can lead to repeated visits. As visitors increasingly seek attractions that emphasize safety while offering innovative and memorable experiences, the role of AR has grown even more essential. Thus, the success of Taman Safari Indonesia's AR offerings depends on its ability to create meaningful interactions that resonate with visitors, ultimately strengthening loyalty. This, in turn, contributes to the implementation of sustainable tourism practices in Taman Safari Indonesia, enhancing conservation efforts and visitor loyalty, particularly in the post-COVID-19 context.

Conclusions

Based on the results, the path value between satisfaction and loyalty was 3.760, exceeding the t-table value of 1.96 at the 95% confidence level. This finding confirms the significance of the study: the higher the satisfaction, the greater the loyalty, meaning that visitors are more likely to return to Taman Safari Indonesia (TSI) after experiencing AR attractions. This study indicates that visitor loyalty to technology-based AR attractions in Taman Safari Indonesia is closely tied to the enriched experience, particularly in the post-COVID-19 environment. Integrating AR technology enhances visitor experience and supports sustainable tourism practices, fostering a stronger connection between visitors and wildlife conservation. As the tourism sector recovers from the impact of the pandemic, AR attractions can attract visitors who prioritize safety, engagement, and educational value. This implies that when visitors have a fulfilling and enjoyable experience at Taman Safari Indonesia (TSI), particularly with the Augmented Reality (AR) attractions, they are more inclined to revisit the TSI.

Author Contributions

RSH: Data collection, data analysis, writing, and review; **RS**: Supervision, data analysis, writing, and review; **HP**: Data analysis, writing, and review; **NBM**: Data analysis, writing, and review.

Conflicts of Interest

There are no conflicts to declare.

References

1. Anggarini, D.T. Upaya Pemulihan Industri Pariwisata Dalam Situasi Pandemi Covid -19. *Jurnal Pariwisata* **2021**, *8*, 22–31, doi:10.31294/par.v8i1.9809.
2. Atmojo, M.E.; Fridayani, H.D. An Assessment of Covid-19 Pandemic Impact on Indonesian Tourism Sector. *Journal of Governance and Public Policy* **2021**, *8*, 1–9, doi:10.18196/jgpp.811338.
3. Bascha, U.F.; Reindrawati, D.Y.; Witaningrum, A.M.; Sumardiko, D.S. Dampak Pandemi COVID-19 Terhadap Minat Masyarakat dalam Berwisata dan Sosialisasi Penerapan Protokol New Normal Saat Berwisata. *Jurnal Abdidas* **2020**, *1*, 560–570, doi:10.31004/abdidas.v1i6.129.
4. Gössling, S.; Scott, D.; Hall, C.M. Pandemics, tourism and global change: a rapid assessment of COVID-19. *Journal Sustainable Tour.* **2021**, *29*, 1–20, doi:10.1080/09669582.2020.1758708.
5. UNWTO (United Nations World Tourism Organization). UNWTO World Tourism Barometer, Volume 18, Issue 1. 2020. Available online: https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-01/Excerpt_UNWTO_Barom20_01_January.pdf (accessed on 9 March 2023).
6. Mao, Y.; He, J.; Morrison, A.M.; Coca-Stefaniak, J.A. Effects of tourism CSR on employee psychological capital in the COVID-19 crisis: from the perspective of conservation of resources theory. *Current Issues in Tourism* **2021**, *24*, 2716–2734, doi:10.1080/13683500.2020.1770706.
7. Sánchez-Cañizares, S.M.; Cabeza-Ramírez, L.J.; Muñoz-Fernández, G.; Fuentes-García, F.J. Impact of the perceived risk from Covid-19 on intention to travel. *Current Issues in Tourism* **2021**, *24*, 970–984, doi:10.1080/13683500.2020.1829571.
8. Hoque, A.; Shikha, F.A.; Hasanat, M.W.; Arif, I.; Hamid, A.B.A. The effect of Coronavirus (COVID-19) in the Tourism Industry in China. *Asian Journal of Multidiscipline Studies* **2020**, *3*, 52–58.
9. Škare, M.; Soriano, D.R.; Porada-Rochoń, M. Impact of COVID-19 on the travel and tourism industry. *Technological Forecasting & Social Change* **2021**, *163*, 1–14, doi:10.1016/j.techfore.2020.120469.
10. Saway, W.V.; Alvianna, S.; Estikowati; Lasarudin, A.; Hidayatullah, S. Dampak Atraksi, Amenitas Dan Aksesibilitas Pantai Pasir Putih Kabupaten Manokwari Terhadap Kepuasan Wisatawan Berkunjung. *Pariwisata Budaya: Jurnal Ilmiah Pariwisata Agama dan Budaya* **2021**, *6*, 1–8.
11. Kounavis, C.D.; Kasimati, A.E.; Zamani, E.D. Enhancing the tourism experience through mobile augmented reality: Challenges and prospects. *International Journal of Engineering Business Management* **2012**, *4*, 1–6, doi:10.5772/51644.
12. Nanni, A.; Ulqinaku, A. Mortality threats and technology effects on tourism. *Annals of Tourism Research* **2021**, *86*, 102942, doi:10.1016/j.annals.2020.102942.
13. Copra, K.; Gupta, B. Location-based augmented reality application for tourism. *Journal of Xi'an University of Architecture & Technology* **2020**, *12*, 973–982.
14. Keckes, A.L.; Tomicic, I. Augmented Reality in Tourism - Research and Applications Overview. *Interdisciplinary Description of Complex Systems* **2017**, *15*, 157–167, doi:10.7906/indexs.15.2.5.
15. Chung, N.; Lee, H.; Kim, J.Y.; Koo, C. The Role of Augmented Reality for Experience-Influenced Environments: The Case of Cultural Heritage Tourism in Korea. *Journal Travel Res.* **2017**, *57*, 627–643, doi:10.1177/0047287517708255.
16. Han, S.; Yoon, J.-H.; Kwon, J. Impact of experiential value of augmented reality: The context of heritage tourism. *Sustainability* **2021**, *13*, 1–13, doi:10.3390/su13084147.
17. Han, D.I.D.; Dieck, M.C.T.; Jung, T. Augmented Reality Smart Glasses (ARSG) visitor adoption in cultural tourism. *Leisure Studies* **2019**, *38*, 618–633, doi:10.1080/02614367.2019.1604790.

18. Park, S.; Stangl, B. Augmented reality experiences and sensation seeking. *Tourism Management* **2020**, *77*, 104023, doi:10.1016/j.tourman.2019.104023.
19. Arismayanti, N.K.; Budiarsa, M.; Bakta, I.M.; Pitana, I.G. The Satisfaction Index of Tourists Experience Quality: a Case Study in Bali Tourism Destination. *Russian Journal of Agricultural and Socio-Economic Sciences* **2020**, *105*, 67–77, doi:10.18551/rjoas.2020-09.08.
20. Sugiyono. *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*; Alfabeta: Bandung, ID, 2020; ISBN 978-602-289-533-6.
21. Saurik, H.T.T.; Purwanto, D.D.; Hadikusuma, J.I. Teknologi Virtual Reality untuk Media Informasi Kampus. *Jurnal Teknologi Informasi dan Ilmu Komputer* **2019**, *6*, 71–76, doi:10.25126/jtiik.2019611238.
22. Sundoro, D.P.; Wibawa, S.C. Pengembangan Media Pembelajaran Video Interaktif Berbasis Virtual Reality (VR) Pada Mata Pelajaran Komposisi Foto Digital Di SMK Kartika 2 Surabaya. *IT-Edu : Jurnal Information Technology and Education* **2019**, *4*, 218–224.
23. Kharismajati, G.; Umar, R.; Sunardi, S. Inovasi Promosi Obyek Wisata Purbalingga Menggunakan Teknologi Virtual Reality 360 Panorama Berbasis Android. *Jurnal Informatika dan Komputer* **2020**, *3*, 62–68, doi:10.33387/jiko.v3i2.1756.
24. Sungkono, S.; Apiati, V.; Santika, S. Media Pembelajaran Berbasis Teknologi Augmented Reality. *Mosharafa: Jurnal Pendidikan Matematika* **2022**, *11*, 459–470.
25. Hair, J.F.; Sarstedt, M.; Ringle, C.M.; Mena, J.A. An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science* **2012**, *40*, 414–433, doi:10.1007/s11747-011-0261-6.
26. Al Badi, O.; Khan, F. Examining Challenging Factors of Tourism Entrepreneurship in Oman using PLS-SEM. *International Journal of Research in Entrepreneurship & Business Studies* **2020**, *1*, 48–64, doi:10.47259/ijrebs.115.
27. Hair Jr, J.F.; Hult, G.T.M.; Ringle, C.M.; Sarstedt, M.; Danks, N.P.; Ray, S. *Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R*; Springer: Cham, Switzerland, 2021; ISBN 978-3-030-80519-7.
28. Sulistiowati, R.; Yulianto, Y.; Bakri, S.; Mukhlis, M.; Saputra, D.A. Analysis of Factors Influencing Re-Visit Intentions and Recommending Post-Pandemic Marine Tourism Destinations in Lampung Province. *Journal of Environmental Management and Tourism* **2023**, *14*, 2799–2814, doi:10.14505/jemt.v14.6(70).26.
29. Hudiono, R. Pengaruh Jenis Kelamin dan Usia Terhadap Kecenderungan Berwisata Selama Pandemi COVID-19. *Jurnal Manajemen Perhotelan Dan Pariwisata* **2022**, *5*, 123–128, doi:10.23887/jmpp.v5i2.50060.
30. Maslulah, D.M.; Ratnawati, E. Pengaruh Pendidikan Alam Bebas Terhadap Kesadaran Kelestarian Lingkungan. *Jurnal Eduksos* **2019**, *8*, 1–13.
31. Putri, Y.A.; Silitonga, P. Meningkatkan Kualitas Produk Dan Persepsi Harga Terhadap Loyalitas Pelanggan Melalui Kepuasan Pelanggan Di Mcdonald's Kelapa Dua Depok. *Jurnal Ilmiah Multidisiplin Indonesia* **2022**, *1*, 1947–1961.
32. Khusaeni, A.; Khusaini, K.; Widiarti, A. Dampak Usia, Struktur Keluarga, dan Tingkat Pendidikan Terhadap Perilaku Konsumen (Pengunjung) Destinasi Wisata di Kabupaten Tangerang. *Jurnal Inovasi Pendidikan Ekonomi* **2021**, *11*, 175–186.
33. Bernini, C.; Cracolici, M.F. Demographic change, tourism expenditure and life cycle behaviour. *Tourism Management* **2015**, *47*, 191–205, doi:10.1016/j.tourman.2014.09.016.
34. Tomić, S.; Leković, K.; Tadić, J. Consumer behaviour: the influence of age and family structure on the choice of activities in a tourist destination. *Economic Research-Ekonomska Istrazivanja* **2019**, *32*, 755–771, doi:10.1080/1331677X.2019.1579663.
35. Lauw, V.; Sudiarta, I.N.; Sagita, P.A.W. Analisis Preferensi Wisatawan Staycation Ke Daya Tarik Wisata Di Badung, Bali. *Jurnal IPTA (Industri Perjalanan Wisata)* **2022**, *10*, 106–113.