MANAGING OVERTOURISM THROUGH VIRTUAL TOURISM DURING COVID-19 PANDEMIC

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ABSTRACT
Malang has been officially appointed as the Heritage City, with Heritage Village Kajoetangan as the landmark. The new status adds value to the city yet also brings a risk of overtourism that may disrupt the sustainability of the city. Even though tourist attractions have been reopened in the second quarter of the Covid-19 pandemic, local communities are anxious about tourists visiting their heritage houses. They tend to limit their interactions with visitors, which then decreases their earnings from the tourism sector. This study proposed an alternative solution for this problem by developing a web VR-based virtual tourism. In this Research and Development (R&D), virtual tourism appeared as a strategic visualization suitable to complement the tourism programs in Kajoetangan. Virtual tourism provides a realistic virtual experience that shortens the duration of visits, thereby reducing the visitor flow and controlling overtourism during the Covid-19 pandemic.

The Dutch colonial era that lasted for hundreds of years has brought various acculturations between Western and Indonesian cultures, including architecture and building interiors. In some big cities in Java, ancient buildings are kept and preserved, including in Malang City. Malang is well-known as *Paris van oost Java* as it has the best colonial city planning in the era of the Dutch East Indies in the early 20th century (Handinoto, 1996). Malang City Government has made efforts to bring back the legacy by determining Malang as a Heritage City. Many Dutch heritage architectures have attracted international tourists to visit the city. The Culture and Tourism Office of Malang has developed five heritage tourism corridors — Kayutangan Corridor is one of those five corridors as a cultural heritage site built during the Dutch colonial with photogenic old buildings and houses that raise historical literacy.

Kayutangan Corridor and most of the colonial buildings in Malang were built after 1900 as commercial buildings, office buildings, and colonial residential houses. Commercial and office buildings in this corridor are classified as modern colonial architecture, referred to as the *Nieuwe Bouwen* style, as found in the shops at the intersection and the Kayutangan *Straat* or Jalan Kayutangan shops (now Jalan Basuki Rahmat). These commercial buildings have open space on the first floor, while massive facades for billboards dominate the second floor and above added with flat roofs, horizontal levels, cube-shaped building volumes, and white color (Ridjal et al., 2016).

The Dutch occupied buildings along the arterial road, while the natives lived in indigenous settlements behind the main road. Colonial architectural houses of the Dutch citizens influenced the architectural style of natives' houses. People with high social status also had Colonial-style houses. Meanwhile, the physical features of the colonial settlement houses in Kayutangan were influenced by Javanese and Colonial culture. Generally, the Voor 1900 style describes the details of the house characterized by slender cast-iron columns, ceilings, shield-shaped roofs, symmetrical floor plans, open terraces, iron fences, window trellises mixed with Javanese style in the forms of ornaments and traditional *joglo*[1] style (Cahyani et al., 2015).

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[1] *Javanese traditional house.*

As a Heritage City, Malang will surely attract more tourists, yet the risk of overtourism also increases. Excessive tourism can threaten the sustainability of the site. The term overtourism describes potential problems and impacts of higher tourist flows and tourism activities exceeding the maximum capacity (Oklevik et al., 2019). In an overtourism condition, both residents and visitors will have their quality of life decreases and lower quality experience for tourists (Goodwin, 2017). In addition to triggering visitor-resident irritants (Doxey, 1975), overtourism can be ultimately harmful to tourism development as double-edged-sword (Gowreesunkar and Seraphin, 2019), steady-state tourism (Hall, 2010), de-growth tourism (Büscher and Fletcher, 2017), or slow tourism (Fullagar, Markwell, and Wilson, 2012). In such conditions, overtourism will grow beyond urban problems as a social problem, particularly city problems (Koens et al., 2018).

Kayutangan is likely to experience overtourism as this site suffers from privacy issues and the dualism of space functions. Kayutangan is a settlement area for local residents and as the world cultural heritage site at the same time. In fact, according to Lynch (1981), the citizen is also an essential factor in building the image of a place (in this context, referring to tourist destination image) as citizens create a particular environment through their behaviors and creativity. The citizens also need to provide convenience for tourists. The plan to reopen this site by the second quarter of the Covid-19 pandemic makes local residents anxious about tourists visiting their homes, while limiting interaction with tourists causes lower income.

In addition, environmental issues in general such as natural degradation (Mehta, 2017), development activities such as changing the function of buildings, the addition of building functions, and demolition also occur (Barrera-Fernandez et al., 2016). Furthermore, the impacts also include high population density (García-Hernández et al., 2017). Public indifference (Nyaupane and Timothy, 2016) increases the risk of detrimental tourist behavior such as theft of cultural attributes (Palanca-Tan et al., 2015), vandalism (Gaigher, 2011; Ruoss and Alfare, 2013), destruction due to human negligence (Pwiti, 2011), waste disposal (Uchiyama, 2012), pollution (Azam et al., 2018), ambitious tourism planning and commercialization (Nasser, 2003), and low capacity and carrying capacity of the destination for local residents and tourists (Cimnaghi and Mussi, 2015). Kayutangan does not have adequate amenities. Narrow alleys dominate access to this site, and the parking lots are limited. This situation might disrupt the stability of the site, for no sufficient space is available for tourists to keep distant and limit their interactions during the Covid-19 pandemic.

Tourism is a social activity that gets local residents and tourists to interact. This interaction should be the focus in designing strategies to address overtourism (Gonzalez et al., 2018; Perkumienė and Pranskūnienė, 2019). New technologies such as virtual reality (VR) can help tourists plan their trips before arriving at their destinations and help the management design tourist preferences to meet their expectations while managing tourist crowds (Simón et al., 2004). Some researchers, such as Zafar et al. (2015), Pharr (2011), and Lui et al. (2007) stated that the development and application of advanced simulation systems, visualizations, and related technologies such as virtual reality could be a strategy. In line with the UNWTO strategy (2018), which aims to spread the flow of tourists in space and time to prevent overtourism, virtual reality for tourism can be applied. This technology allows tourists to enjoy the heritage buildings with their unique design and colonial house architecture without physically visiting the site.

Virtual tourism offers a strategy to overcome the intense high flow of tourist visits (Voronkova, 2018). Virtual world content based on virtual reality technology for tourism is referred to as virtual tourism. Virtual tourism (Guttentag, 2010; Saren et al., 2013; Moorhouse et al., 2018) employs virtual reality technology in storing and providing exact and accurate data sets that can be useful for monitoring degradation and providing blueprints for restoration of these sites and objects (Guttentag, 2010). Virtual cultural heritage tourism helps preserve cultural heritage and significantly increases its accessibility (Tonta, 2008). Through the realistic experience offered by virtual reality, the impacts that visitors can bring to the sites will be reduced. Thus, the original cultural heritage will not be at risk of being damaged as they can enjoy the site through simulation (Cheong, 1995).

Virtual tourism offers a realistic experience while eliminating the risk of damages to heritage sites and allows visits to areas that are prone to environmental damages (Guttentag, 2010). It is done by diverting the number of tourist visits to half virtual visits (Hu et al., 2012) or being used as an alternative to physical visits (Kaelber, 2007). Virtual tourism can even be used for planning individual tourist trips to fit the carrying capacity of the destinations (Stepaniuk et al., 2014). Hu et al. (2012) view virtual tourism as an element of tourism activities that are economically safe and modern.

The list of heritage sites that can be accessed virtually is getting longer as many cultural heritage sites in the world open themselves to be accessed virtually. The list includes the Santa Maria Paganica Church in L'Aquila, Italy (De Gasperis et al., 2018), the ancient city of Palmyra in Syria (Denker, 2017), Geguti Palace in Georgia (Ferrari and Medici, 2017), and the city of Mtskheta in Georgia (Menghi et al., 2011).

Some Indonesian researchers have developed virtual tourism content that focuses on tourism promotion for history e-learning purposes (Fauzi and Gozali, 2015; Syarifuddin, 2017). Threesiana et al. (2013) have developed GIS virtual reality content for *Candi Sewu* preservation purposes. This present study identified the current condition of the Kayutangan cultural heritage concerning excessive tourist visits and overtourism. This study also developed Kayutangan virtual tourism content to solve the problems.

This study also analyzed the virtual experience of tele-tourists after visiting the Kayutangan virtual tourism regarding the ability of the content to provide immersion and telepresence. The virtual experience is assessed by how well it gives a sense of physical presence (immersion) and a sense of psychological presence (telepresence) (Gutie´rrez et al., 2008). Experience is a significant part of tourism where Martin (2016) stated, "tourism may be regarded as a fantasy selling industry which is in turn transformed into consumable commodities or experiences". The experience of tele-tourists while visiting virtual destinations is an important indicator based on the theoretical opinions in the Technology Acceptance Model 2 (TAM2) developed by Venkatesh and Davis (2000), Technology Acceptance Model 3 (TAM3) by Venkatesh and Bala (2008), and the Unified Theory of Acceptance and Use of Technology (UTAUT) from Venkatesh, Morris, Davis, and Davis (2003). All of the theories state that the experience felt by users while using technology will moderate user acceptance, both in terms of behavioral intention and actual use of the technology.

LITERATURE REVIEW

Popular tourist destinations have reached a tipping point. Tourist destinations are too crowded — this condition is referred to as mega-mass tourism (Wheeller, 1993), anti-tourist (Dioko, 2017), tourismphobia (Martins, 2018), overcrowded tourism (Popp, 2012), over mobility (Seraphin et al., 2019), tourism pressure (Zanini, 2017), or more popularly known as overtourism. Richardson (2017) defined over-tourism as any destination suffering the strain of tourism.

UNESCO states that cultural heritage sites can experience ascertained danger where properties are at risk of specific and real hazards soon and potential threats in the future that can indirectly bring adverse effects on its innate characteristics (World Heritage Committee, 2009).

Several researchers, such as Voronkova (2018) and UNWTO (2018), have suggested the development of virtual tourism to become a complementary destination to reduce tourist visits, prevent visitors from staying too long in the site and break down the flow of tourists to reduces overtourism. Virtual tourism is defined as the contemporary internet-based tourism experience about real tourist attractions (i.e., internet tourist, e-tourist, tele-tourist) (Stepaniuk et al., 2014).

This new technology emerges new tourist activities to complement conventional tourist experiences (Zejda and Zejda, 2016). One of them is a virtual experience, which is defined as the capacity to provide a sense of physical presence (immersion) and a sense of psychological presence (telepresence) in a virtual environment (Gutie´rrez et al., 2008).

Slater and Wilbur (1995) define immersion as the level of objectivity regarding the sensor accuracy provided by a virtual reality system. Meanwhile, telepresence refers to the users' subjective psychological responses to the virtual reality system.

Technology Acceptance Model 2 (TAM2) from Venkatesh and Davis (2000), Technology Acceptance Model 3 (TAM3) from Venkatesh and Bala (2008), and Unified Theory of Acceptance and Use of Technology (UTAUT) from Venkatesh, Morris, Davis, and Davis (2003) can be used to gain a better understanding of virtual environments and to analyze its impacts on tourists' interests and behavior. The experience in visiting virtual environments plays an important moderating role. In addition, Sarkady et al. (2021) found VR as a substitute for travel during and even after the Covid-19 pandemic. Therefore, in this study, we developed VR content to help manage overtourism, conform with health protocols, and manage tourist flow during the Covid-19 pandemic.

METHODS OF RESEARCH

This Research and Development was conducted using a qualitative approach consisting of direct observation techniques, audio-visual materials, and interviews. Meanwhile, we employed the Multimedia Development Life Cycle (MDLC) model to develop virtual tourism content. Gall et al. (2003) stated that "research and development have two main objectives: to develop a product and test the product's effectiveness". Furthermore, MDLC is a method for developing multimedia applications. Virtual tourism content can be classified as a multimedia application because it contains photos, images, audio, and even video as the primary material. The MDLC method consists of six stages: concept, design, collecting material, assembly, testing, and distribution (Luther, 1994).

To measure the impacts of excessive tourism and the potential for overtourism at the research location, we used the indicators of world heritage cultural properties assessment and dangerous conditions determined by UNESCO, which consist of ascertained dangers and potential dangers (UNESCO World Heritage Center, 2012).

In developing virtual tourism content, there were several main objects of virtual tourism, according to Stepaniuk et al. (2014), including a 360° photo gallery. This research developed web-VR-based virtual tourism using A-Frame software. A-Frame is a JavaScript framework for coding virtual reality in a browser that meets certain specifications.

In this study, virtual experiences were assessed by the ability of virtual tourism content to provide immersion and telepresence. Meanwhile, to measure immersion, we used indicators from Ermi and Mäyrä (2005) and Slater and Wilbur (1995), while telepresence was evaluated using the MEC Spatial Presence Questionnaire (MEC-SPQ; Vorderer et al., 2004).

The objects of this study were seven colonial houses. They have been officially designated as cultural heritage and have official plaques installed, namely Jengki House, Noble House, Jacob House, Mbah Ndut House, Herbal House, Grandmother Honggo Kusumo's Tomb, and Krempyeng Market. In addition, for content assessment, open-ended interviews were held with five informants, namely tele-tourists who visited Kayutangan virtual tour developed in this study, where the "yes" response scored 1 and "no" scored 0 in one shot case study experimental.

In this study, data were triangulated to compare the results of the interview and peer review informants with research colleagues.

The results of observations and audio-visual material in texts, videos, and 360 photos were analyzed using content analysis. The results of interviews were analyzed based on descriptive statistical analysis.

RESULTS AND DISCUSSION

In the concept stage, the passive participation observation method was carried out. The observations showed that Kayutangan had been threatened by potential dangers that could threaten the sustainability of the site.

From a total of 19 observation items for ascertained danger, 13 question items showed evidence of real dangers that could threaten the Kayutangan site with a percentage of 16.8%. The results of the observations also indicated overtourism such as disturbances in the life cycle and lifestyle of the community due to tourism, the emergence of tourists as temporary residents, density level exceeding the carrying capacity, changes in building functions, modification of the buildings from the original forms, demolition for tourism purposes, and layout or spatial planning to attract tourists that did not go well with residents' expectations. Such conditions then triggered disintegration and restrictions to access to resources among residents because they had to prioritize tourists. The local people might also feel uninvolved in regional developmentt, leading to conflicts between residents and tourists and privacy disruption. Most residents complained about the loss of privacy and family comfort because their house became an attraction area.

In addition, from a total of four question items for potential dangers, it was found that the Kayutangan site was 100% being under threat. In general, Kayutangan is a potentially profitable tourist attraction. However, the privacy-related issues, inadequate environmental access, poor conflict management, and changes in the site's originality through murals and designs implied that the management was too ambitious. There must be changes in the management since such commercialization may harm the area indirectly.
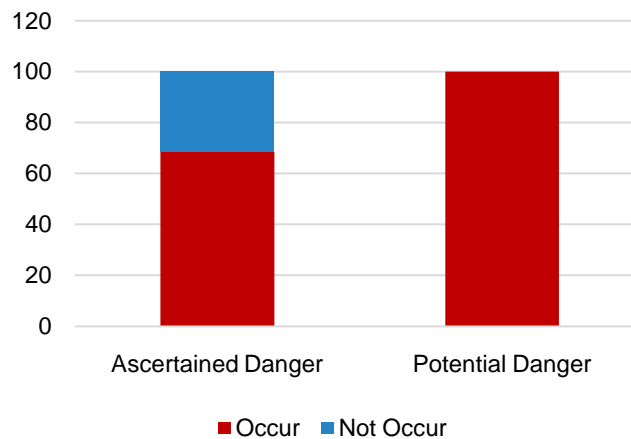

Figure 1 – The Percentage of Ascertained Danger and Potential Danger in Kayutangan

In this stage, the system design was developed based on chart flow and storyboard as the basic concept of virtual tourism being developed and the grand design of the content.
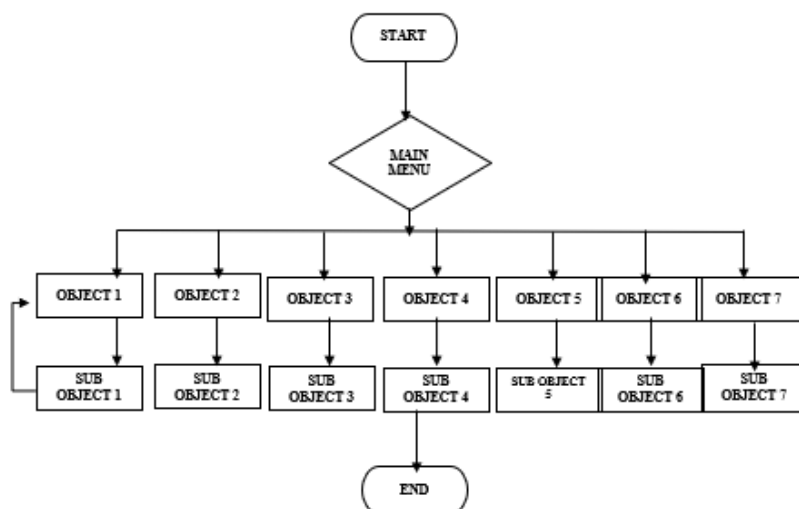

Figure 2 – Flowchart of Kayutangan Virtual Tourism Content

Material Collection stage was carried out using the audio-visual method. The audio-visual material of this study were 360° photos of the Kayutangan site taken using Ricoh Theta SC 360° Camera, Android Smartphone, Digital Camera, and Ricoh Theta application software apk 1.26.0 for Android.

In the assembly stage, all virtual tourism objects or materials were made. Content creation required a set of PC with Windows OS, Gear Bobo VR Z5, Android Smartphone, and software (software) in the form of A-Frame, Glitch, Cardboard VR Application with a display as shown in Figure 3.

Figure 3 – The Display of Kayutangan Virtual Tourism Content

After completing the assembly stage, the testing stage was carried out by testing the content using a virtual user experience assessment while exploring the Kayutangan virtual tourism destination, Kampoeng Heritage Kajoetangan. The assessment was done on virtual tourism products and measurement of the ability of virtual tourism in providing a sense of physical presence (immersion) and psychological presence (telepresence). Interviews were administered to five tele-tourist informants who visited Kampoeng Heritage Kajoetangan virtual tourism. Informants responded to questions using "yes" or "no" answers. The assessment results showed that the ability of the content to provide a sense of physical presence (immersion) was lower than the ability of the content to give a sense of

psychological presence (telepresence). Therefore, the content was regarded as suboptimal in providing a virtual experience.

Fortunately, virtual tourism content developed in this study is a feasible alternative solution considering the potential dangers and real dangers that threaten Kampoeng Heritage Kajoetangan. This product is expected to continue running either as a complementary product or as a substitute for physical tourist visits to Kampoeng Heritage Kayoetangan to minimize excessive tourist visits during the Covid-19 pandemic.

Table 1 – Results of Interviews and Triangulation on Immersion

Variable: Immersion (Sense of Physical Presence)								
Dimension	Indicator	Results of Interview					Triangulation	Notes
		1	2	3	4	5	Peer Review	
Challenge-Based Immersion	Mental Skill/Strategic Thinking	1	1	1	1	1	1	Valid
	Motoric Skill/Problem Solving	1	1	1	1	1	1	Valid
	Goals	1	1	1	1	1	1	Valid
System Immersion	Remote Gesture	0	0	1	1	1	1	Valid
	Head Movement	1	1	1	1	1	1	Valid
	Audio/Stereophonic	0	0	1	1	1	1	Valid
	Music	0	0	0	1	1	1	Valid
	Lighting	1	1	0	0	1	1	Valid
	Hand Movement	0	0	0	1	1	1	Valid
	Walking	0	1	1	0	0	1	Valid
	Colour Resolution	1	1	0	0	1	1	Valid
	Quality of graphics display/dimensional	1	1	1	1	1	1	Valid
	Richness	1	1	1	1	1	1	Valid
	Information content	1	1	0	0	1	1	Valid
	Large screen/wideness/interface	1	1	1	1	1	1	Valid
	Vibration	0	0	0	1	1	0	Valid
Imaginative Immersion	Narration/storyline	0	1	0	1	1	0	Valid
	Panorama/imaginary world and fantasy	1	1	1	1	1	1	Valid
	Shut down form reality	1	1	1	0	1	1	Valid
	Time and space beyond the display	1	1	1	1	1	1	Valid
	Character/Avatar/Embodiment	0	1	0	1	0	0	Valid
	Theme	1	1	1	1	1	1	Valid
	TOTAL	11	13	10	13	16	15	Valid

Table 2 – Results of Interview and Triangulation on Telepresence

Variable: Telepresence (Sense of Psychological Presence)								
Dimension	Indicator	Results of Interview					Triangulation	Notes
		1	2	3	4	5	Peer Review	
Self-Location	Feeling real in the VR environment	1	1	1	0	1	1	Valid
	Feeling like truly exploring the VR environment	1	1	1	1	1	1	Valid
	The location seems real	1	1	0	0	1	1	Valid
	Feeling as if I am physically present in the VR environment	1	1	1	1	1	1	Valid
Possible Action	Objects presented in VR make me feel able to do a lot with them	1	1	0	1	0	1	Valid
	Getting the impression of being able to be active in the VR environment (playability)	1	1	0	1	1	1	Valid
	I am feeling able to move around the objects	1	1	0	1	1	1	Valid
	I can do any actions in the VR environment	1	1	0	1	0	1	Valid
	TOTAL	8	8	3	6	6	8	Valid

In addition, the validity of the data was tested in triangulation by comparing respondents' responses and peer reviews. If at least five respondents and one research colleague gave the same responses, the data were valid.

The virtual tourism contents were stored in a medium easy to access on a hosting platform to online Kayutangan virtual tourism content in the distribution stage. Destination

managers can take advantage of the content as a substitute or complementary product for conventional tourists through virtual reality at the heritage site location.

CONCLUSION

The virtual tourism content developed in this study can be an alternative solution to the potential problems in Kayutangan, including overtourism. This product can act as a complementary product or a substitute product for conventional tourist visits to Kayutangan, for it can provide virtual experiences in the forms of immersion and telepresence. Kayutangan virtual tourism can be a win-win solution to solve problems experienced by destination managers, local residents, and tourists during the Covid-19 pandemic. The product developed in this study supports the findings of studies conducted by Simon (2004), Voronkova (2018), and Sarkady et al. (2021). The results represent a concrete manifestation of the UNWTO program (2018) in overcoming overtourism. Virtual tourism can provide virtual experiences that can reduce physical visits and the use of space while maintaining the sustainability of cultural destinations.

Future researchers are recommended to expand this study by testing the virtual experiences, including immersion and telepresence, using a quantitative approach to gain more comprehensive findings. The use of the quantitative approach also makes the results more generalizable as what has been done by Spielmann et al. (2016), Tussyadiah et al. (2017), Fonseca (2016), and Sarkady et al. (2021).

REFERENCES

1. Azam, M., Alam, M.M. and Hafeez, M.H. (2018). Effect of Tourism on Environmental Pollution: Further Evidence from Malaysia, Singapore, and Thailand, Journal of Cleaner Production, 190, 330-338.
2. Barrera-Fernandez, M. Hernández-Escampa, A. Balbuena. (2016). Tourism Management In The Historic City. The Impact Of Urban Planning Policies, International Journal Of Scientific Management And Tourism, Vol.2, 1, Pp 379-391.
3. Büscher, B., and Fletcher, R. (2017). Destructive creation: Capital accumulation and the structural violence of tourism. Journal of Sustainable Tourism, 25(5), 651–667.
4. Cahyani, R., Wulandari, L.D., Antariksa (2015), Pengaruh Arsitektur Tradisional Jawa dalam Hunian Kolonial di Kampung Bubutan Surabaya , Jurnal RUAS, 13 (1), pp. 56-65
5. Cimnaghi, E., and Mussini, P. (2015). An application of tourism carrying capacity assessment at two Italian cultural heritage sites. Journal of Heritage Tourism, 10(3), 302–313.
6. De Gasperis, Giovani, Cordisco, Alessio and Cucchiara, Francesco (2018), Immersive Virtual Reality as a Resource For Unaccessible Heritage Sites, IOP Conf. Ser.: Mater. Sci. Eng.364 012035.
7. Denker, Ahmet (2017) Rebuilding Palmyra virtually: a recreation of its former glory in digital space. Virtual Archaeology Review, [S.l.], v. 8, n. 17, p. 20-30.
8. Dioko, L.A.N. The problem of rapid tourism growth: An overview of the strategic question. Worldw. Hosp. Tour. Themes 2017, 9, pp. 252–259.
9. Doxey, G. V. (1975) A causation theory of visitor/resident irritants: Methodology and research inferences. Proceedings of the Travel Research Association 6th Annual Conference (195-198). San Diego: Travel Research Association.
10. Ermi, L and F. Mayra (2005), "Fundamental Components of the Gameplay Experience: Analysing Immersion," Proceedings of the DiGRA Conference on Changing Views: Worlds in Play, Vancouver, 16-20 June 2005.
11. Fauzi, A.H., and Gozali, A.A., (2015) Virtual Reality to Promote Tourism In Indonesia, Jurnal Sistem Komputer, Vol. 5, No 2. pp. 47-50.
12. Ferrari, F.; Medici, M. (2017), The Virtual Experience for Cultural Heritage: Methods and Tools Comparison for Geguti Palace in Kutaisi, Georgia. Proceedings, 1, 932.

13. Fonseca, Diana; Kaus, Martin (2016) A comparison of head-mounted and hand-held displays for 360° videos with a focus on attitude and behavior change, Academic Mindtrek '16, Proceedings of the 20th International Academic Mindtrek Conference, pp. 287-296.
14. Fullagar, S., Markwell, K., and Wilson, E. (Eds.). (2012). Slow tourism: Experiences and mobilities (Vol. 54). New York, NY: Channel View Publication.
15. Gaigher, S. (2011). Phase 1 Heritage Impact Assessment. Journal on heritage impact assessment for the proposed Mponeng South mine return dams and water pipeline, Vol.2 No.7, pp8-9.
16. Gall, J., Borg. W., & Gall, M. (2003). Educational research: An introduction (7th Ed.). Boston: Pearson Education.
17. García Hernández, M., Calle Vaquero, M. de la, & Yubero Bernabé, C. (2017). Cultural Heritage and Urban Tourism: Historic City Centres under Pressure. Sustaninability, 9, 1346. 2071-1050.
18. Gonzalez, V. M., Coromina, L., Galí, N. (2018) Over-tourism: Residents' Perceptions Of Tourism Impact As An Indicator Of Resident Social Carrying Capacity - Case Study Of A Spanish Heritage Town. Tourism Review, 73, 3, 277-296.
19. Goodwin, H. (2017). The Challenge of Over-tourism. Responsible Tourism Partnership Working Paper 4.
20. Gowreesunkar, V., and Seraphin, H., (2019), Conclusion: local communities' quality of life: what strategy to address over-tourism? Worldwide Hospitality and Tourism Themes, Vol. 11 No. 5, pp. 627-633.
21. Gunttentag, Daniel A. (2010).Virtual reality: Applications and implications for tourism, Tourism Management 31, pp. 637–651.
22. Gutie´rrez, M., Vexo, F., & Thalmann, D. (2008). Stepping into virtual reality. London: Springer.
23. Hall, C. M. (2010). Changing paradigms and global change: From sustainable to steady-state tourism. Tourism Recreation Research, 35(2), 131–143.
24. Handinoto (1996) Perkembangan Kota dan Arsitektur Kolonial Belanda di Surabaya (1870- 1940). Yogyakarta: ANDI Yogyakarta.
25. Hu Z., Cao Z., Shi J. (2012), Research of Interactive Product Design for Virtual Tour-ism, in D. Jin, S. Lin (eds.), Advances in Electronic Engineering, Communication and Management, Proceedings of the EECM 2011 International Conference on Electronic Engineering, Communication and Management, held December 24-25, 2011, Beijing, China, pp. 411-416.
26. Kaelber, L. (2007) A memorial as virtual traumascape: Darkest tourism in 3d and cyber-space to the gas chambers of Auschwitz, e-Review of Tourism Research 5, 2 (June). pp. 24–33.
27. Koens, K.; Postma, A.; Papp, B. (2018) Is Over-tourism Overused? Understanding the Impact of Tourism in a City Context. Sustainability,10, 4384.
28. Lister, M. Dovey, J. Giddings, S. Grant, I. & Kelly, K. (2003) New Media: A Critical Introduction, Abingdon, Oxon, Routledge.
29. Lui, T. W., Piccoli, G., and Ives, B. (2007). Marketing strategies in virtual worlds. ACM SIGMIS Database: the DATABASE for Advances in Information Systems, 38(4), 77-80
30. Luther, Arc C. (1994). Authoring Interactive Multimedia. AP Professional. Boston.
31. Lynch, Kevin (1981) A Theory Of Good City From, The MIT Press. Cambridge.
32. Martins, Marco (2018). Tourism Planning and Tourismphobia: An Analysis of the Strategic Tourism Plan of Barcelona 2010-2015. Journal of Tourism, Heritage & Services Marketing, 4(1), 3–7.
33. Menghi, Roberta, Maino, Giuseppe, and Panebarco, Marianna (2011), Virtual Reality Models for the Preservation of the Unesco Historical and Artistical Heritage in Maino, G. and Foresti, G.L. (Eds.) ICIAP 2011, Part II, LNCS 6979, pp. 475–485.
34. Moorhouse, N., Dieck, M.C.,and Jung,T. (2018). Technological innovations transforming the consumer retail experience: A review of literature. InT. Jung, and M. Dieck (Eds.). Augmented reality and virtual reality. Progress in IS (pp.133–143).Cham: Springer.

35. Nasser N. (2003). Planning for Urban Heritage Places: Reconciling Conservation, Tourism, and Sustainable Development. Journal of Planning Literature, 17(4): 467–479
36. Nyaupane, Gyan P. and Timothy, Dallen, (2016), "Public Awareness and Perceptions of Heritage Buildings in Arizona, USA", Travel and Tourism Research Association: Advancing Tourism Research Globally. 32.
37. Oklevik, O.; Gössling, S.; Hall, C.M.; Steen Jacobsen, J.K.; Grøtte, I.P.; McCabe, S. (2019), Over-tourism, optimisation, and destination performance indicators: A case study of activities in Fjord Norway. J. Sustain. Tour., 1–21.
38. Palanca-Tan, Rosalina; Garces, Len Patrick Dominic M.; Purisima, Angelica Nicole C.; and Zaratan, Angelo Christian L. (2015) Tourism and Crime: Evidence from the Philippines. Southeast Asian Studies, Vol. 4, No. 3, pp. 565-580.
39. Perkumienė, D., and Pranskūnienė, R. (2019). Over-tourism: Between the Right to Travel and Residents' Rights. Sustainability, 11(7), 2138.
40. Pharr, J. M., (2011) A research agenda for investigating the effectiveness of branding in virtual reality, Journal of Management and Marketing Research 8, pp.1-11.
41. Popp, M. (2012). Positive and negative urban tourist crowding: Florence, Italy. Tourism Geographies, 14(1), pp. 50-72.
42. Pwiti, G. (2011). Global Heritage Fund, Site conservation assessment. University of Zimbabwe Press.
43. Richardson, D. (2017). Suffering the strain of tourism. Retrieved from: (TTG@wtm).
44. Ridjal, A.M., Antariksa, Suryasari, N., Santoso, J.T. (2016), Building Form berdasarkan Sejarah Kawasan Bangunan pada Jalan Basuki Rahmat Malang, Jurnal RUAS, 14 (2), pp.34-46.
45. Ritzer G., (1998), The McDonaldization Thesis: Explorations and Extensions, London: SAGE Publications.
46. Ruoss, E. and Alfarè, L. (2013) Sustainable Tourism as Driving Force for Cultural Heritage Sites Development.Planning, Managing and Monitoring Cultural Heritage Sites in South East Europe. CHERPLAN project report, April 2013, 161 p.
47. Saren, M., Harwood, T., Ward, J., and Venkatesh, A. (2013). Marketing beyond the frontier? Researching the new marketing landscape of virtual worlds. Journal of Marketing Management, 29 (13–14), 1435–1442.
48. Seraphin, H., Gowreesunkar, V., Zaman, M. and Lorey, T. (2019), "Limitations of Trexit (tourism exit) as a solution to over-tourism", Worldwide Hospitality and Tourism Themes, Vol. 11 No. 5, pp. 566-581.
49. Simón, F. J. G., Narangajavana, Y., & Marqués, D. P. (2004). Carrying capacity in the tourism industry: A case study of hengistbury head. Tourism Management, 25(2), 275-283.
50. Sarkady, D., Neuburger, L., and Egger, R (2021) Virtual Reality as a Travel Substitution Tool During COVID-19, in W. Wörndl et al. (Eds.): Information and Communication Technologies in Tourism 2021, pp. 452–463, 2021.
51. Slater, M., and Wilbur, S. (1997) A framework for Immersive Virtual Environments (FIVE): Speculations on the Role of Presence in Virtual environments. Presence: Teleoperators and Virtual Environments, pp. 603-616.
52. Spielmann, Nathalie, Antonia Mantonakis, Barry J. Babin, and Aikaterina Manthiou (2016), "The Telepresence Effect: Changing Attitudes Via Virtual Tours in Marketing Communications", in NA - Advances in Consumer Research Volume 44, eds. Page Moreau and Stefano Puntoni, Duluth, MN: Association for Consumer Research, pp. 759-759.
53. Stepaniuk, Krzysztof; Bałakier, Urszula and Januszewska, Adrianna (2014) Virtual tours in the users of social networking sites in Poland and Belarus, Economics and Management, Issue 1, pp. 333-345.
54. Syarifuddin, Alhadharah (2017), Virtual Museum: A Learning Material Of Indonesia National History, Jurnal Ilmu Dakwah 16 (32), pp.43-58.

55. Threesiana, R., Suwardhi, D., and Riyanto, S., (2013) "Pembangunan virtual reality GIS untuk dokumentasi konservasi warisan budaya (study kasus: kompleks Candi Sewu)." Indonesia Journal of Geospatial, Vol. 1, No. 2, pp. 17 – 30.
56. Tonta, Y. (2008). Libraries And Museums In The Flatworld: Are They Becoming Virtual Destinations? Library Collections, Acquisitions & Technical Services, 32(1),1–9.
57. Tussyadiah, I.P., Wang, D., & Jia, C.H. (2017). Virtual reality and attitudes toward tourism destinations. In Schegg, R., & Stangl, B. (Eds.), Information and Communication Technologies in Tourism 2017. Springer International Publishing.
58. Uchiyama, Christienne (2012), Waste of Place: Heritage Conservation and Environmental Assessment", The Many Voices of Heritage. Canadian Studies Heritage Conservation Programme Symposium. March 24th, 2012, Ottawa. Organised by the School of Canadian Studies Heritage Conservation Programme, Carleton University.
59. UNWTO (2018), 'Over-tourism'? Understanding and Managing Urban Tourism Growth beyond Perceptions; UNWTO: Madrid, Spain.
60. Venkatesh, V. and Bala, H. (2008). Technology Acceptance Model 3 and a Research Agenda on Interventions. Decision Science, 39 (2), 273-312.
61. Venkatesh, V., and Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46 (2), 186-204.
62. Venkatesh, V., Morris, M.G., Davis, F.D., & Davis, G.B. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27, pp. 425-478.
63. Vorderer, P., Wirth, W., Saari, T., Gouveia, F. R., Biocca, F., Jäncke, L., (2004) Development of the MEC spatial presence questionnaire (MEC-SPQ). Unpublished project report. Presence: MEC (IST-2001-37661).
64. Voronkova, L.P (2018), Virtual Tourism: on the Way To the Digital Economy, International Multi-Conference on Industrial Engineering and Modern technologies IOP Conf. Series: Materials Science and Engineering 463, pp. 1-6.
65. Wheeller, B. (1993). Sustaining the ego. The Journal of Sustainable Tourism,1(2), pp. 121–129.
66. World Heritage Committee (2009) List of World Heritage in Danger, United Nations Educational, Scientific And Cultural Organization, WHC-09/33.COM/9 Paris 1 May 2009
67. Zafar, A., Abumelha, M., Alharthi, M., Jammal, M., Alghamdi, N., Khoja, S. (2015) Virtual organization as a strategic tool: Past, Present, and Future, International Journal of Computer Systems, Volume 02– Issue 04, pp. 108-114.
68. Zanini, Sara (2017) Tourism pressures and depopulation in Cannaregio: Effects of mass tourism on Venetian cultural heritage, Journal of Cultural Heritage Management and Sustainable Development Vol. 7 No. 2, pp. 164-178.
69. Zejda, P., and Zejda, D. (2016). The exploitation of the Virtual Worlds in tourism and tourism education. Czech Journal of Tourism, 5(2), 173–188.