Chapter 11
Perceptions of Augmented Reality Application for Tourism Promotion in the Buddhist Vihara at Paharpur of Bangladesh: A Qualitative Research

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Abstract The study aims to assess the perceptions of the stakeholders and tourists towards the implementation of potential AR application within the cultural, heritage and museum context. Besides, this study has chosen the Buddhist Vihara at Paharpur World Heritage Site (WHS) as a sacred and religiously important tourist site in which the stakeholders' perception regarding possible implementation of AR is checked. This study also deliberates the concept of AR and application of AR in tourism. The reasons for applying modern technological tool like AR with the real world setting are identified. Essential components for implementing the AR tool at the site are explored and discussed. This qualitative research is mostly relied on in-depth interviews and focus group discussion for data and information collection in line with reviewing the existing literature. Data were collected from thirteen stakeholders and tourists. Findings of the study reveals that AR application has perceived positive benefits like experiential, economic, cultural & historical, educational and aesthetic value. This study also shows the challenges like management challenges, visitors' incapability, financial challenges and informational challenges those might hinder the implementation of AR at the site. The study moreover shows the relationship between sustainability and AR application. Besides, the authors argue that the implementation of AR application at the site will benefit the stakeholders (local community, visitors, employees, and tour operators etc.). Limitations and future research directions are given at the consequent stages of this paper.

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175

Introduction

Continuous development of technology has been tremendously changing the behavior of consumers in tourism and hospitality industries for last decades (Loureiro et al., 2020). In tourism and hospitality services industry advanced technology are prerequisite to meet the present-day needs and demands of tourists. Through the application of innovative technology visitors can get augmented services in information search, purchase, or even in post purchase stage (Ali, 2016; Lemon & Verhoef, 2016; Loureiro et al., 2020). For appealing and enticing the customers Augmented Reality (AR) is one of the best pioneering technological instruments that has been adopting in tourism and hospitality industries in developed countries since couple of years (Han et al., 2014; Siang et al., 2019). Many tourist destinations are constantly using the AR tools to accelerate the pace of development and increase the position in the tourism competitiveness (Han et al., 2014). Technological integration in providing business services especially in tourism services are becoming inevitable to sustain in the competitive market (Han et al., 2014). Advanced technology like augmented reality can be a viable strategic tool for the marketers of tourism products and services to satisfy the demand of tourism customers (Dadwal & Hassan, 2015). The concept of augmented reality is somewhat unidentified to traditional tourism and hospitality marketers and business policy planners nevertheless it has numerous possibilities and flairs (Neuhofer et al., 2012). The AR is an innovative means of communicating and involving consumers or tourists by enhancing their representativeness and delivering an experience that is much more than physical representativeness. Consumers' interaction with technological devices has increased all over the world which actually increased the potentiality of AR and Virtual Reality (VR) in tourism industry. Use of AR can enhance the tourist satisfaction and loyalty (Hassenzahl, 2003).

In Bangladesh, there are lots of tourist treasurers, spots, sites, monuments, museums, archeological structures which have great appeals to the tourists and visitors (Rakib & Hassan, 2020; Pramanik & Rakib, 2020). The appeals of the tourist can be enhanced by exploiting the benefits of advanced technological tools like AR which can provide interactive and memorable experiences. The marketers, policy makers and destination managers of Bangladesh tourism industry can exploit the AR applications to stimulate and expand the reality and eventually to engage the consumers in innovative and dynamic ways (Guttentag, 2010). This study explains the possibilities of technology supported tourism specially AR in the Buddhist Vihara at Paharpur of Bangladesh. Buddhist Vihara is one of the most imperative archeological sites in Bangladesh which had been acknowledged as World Heritage Site (WHS) by UNESCO in 1985. This study explores the perceptions (positive and

negative) of stakeholders of the destination regarding implementation of potential AR tools. Moreover, present study also describes how AR can help the destination marketers and managers to change the usual perception and provide better visiting experience to the tourists.

Brief Synopsis of Paharpur Buddhist Vihara with Its Structure and Constituents

One of the most antique and remarkable archeological sites which is situated at the Paharpur, Badalgachi Upazila of Naogaon District of Bangladesh is Paharpur Buddhist Vihara. The early name of the Vihara was Somapura Mahavihara. Paharpur Buddhist Vihara was constructed during the Pala period in seventh century when the monarch of ancient Bengal was Dharma Pal. The Vihara reflects the history of different religions of the region namely Buddha, Hindu (Sanatan dharma), and Jaina. The Vihara also used as an important intellectual center for the Buddhists, Hindus and Jains. Although this monastery was reduced to rubble due to historical and geographical reasons, this glorious monastery still stands pompously as the largest Buddhist monastery in Asia. The Vihara is also known as mini version of the ancient Nalanda University. In 1985 UNESCO announced the magnificent monastery as a World Heritage Site (WHS).

The style and structure of the Vihara was unique in the subcontinent. The unique Vihara is led by a temple which was not also usual. The features of the temple were not similar with the features of the temples of Indian subcontinent. Actually the temple reflects the structure and memories of Buddhist temples of Cambodia, Burma and Java (The Daily Asian Age, 2016). The Vihara has cruciform basement, attached structure with inset chambers and progressively declining pyramid (The Daily Asian Age, 2016). The Vihara is almost 72 feet high from the ground and the Vihara with its remains covers 27 acres of land (Hassan & Rahman, 2015). In the Vihara there are 63 stone plate statues are available which reflects the different religious beliefs and traditions (The Daily Asian Age, 2016). Various decorative terracotta plaques are insisted in the outside walls of the Vihara. The whole area is spread over a number of temples, stupas and ancillary buildings (Hassan & Rahman, 2015). The complex is surrounded by 177 small lodging rooms for the monks. The remains of slabs to place Buddha's statues are found in each room which shows that monks were always in the presence of Buddha and even spent their private time in study, meditation and also for accommodation. Another attraction of this Vihara is it has a central temple which is cruciform ground plan. The temple has a length of 357 feet from north to south and a width of 314 feet from east to west (The Daily Asian Age, 2016).

Adjacent to the Vihara there is a well-maintained museum with a collection of old relics from its prime period, where enormous information is available. The name of the museum is "Paharpur Museum, Naogaon" which was established in 1957 and

extensively modernized in 2016. Different statues, ornamental terracotta plaques, stones, sands stones, ornamental bricks, ceramics, carvings, remains and relics of the Vihara are reserved in the museum for demonstration which are impressive and were collected from Paharpur and its surrounding areas. Some of the mentionable names of the statues are Broken Parts of "Visnu", "Broken Statue of Laxmi Narayan", and "Uma" which are the statues of Krishna Stone. "Chamunda", "Keerti", "Gouri", "Visnu", "Mansha" which are Clay Stone of statues. Besides those there are some other statues which are "Seetala" statue of Red Stone, damaged "Haargouri" statue, "Nandi Statue", "Sun Statue" and so on. The antiquities of the museum are made of diverse ingredients and they carry memories of different eras. There is a well decorated garden outside this museum. There are charming topiaries with elephants, giraffes and a number of other features in the garden. The great monastery also comprises of picnic spots, shades and mosque outside the monastery.

Significance of the Study

Nevertheless, the Paharpur Vihara is very affluent in the richness of history. Various antiquities of the sixth to twelfth centuries have found a place here. The Vihara has the largest number of relics of Buddhist civilization. In the glory of life, roads, history and tradition the Vihara is very colorful and lively. The destination contributes greatly to the local and national economy. The revenue from this monastery in income year 2016–2017 was BDTk. 72 lakh, and soared further to BDTk. 77.25 lakh in the income year 2017–2018. In 2018–2019 the income was BDTk. 76.60 lakh. As prices of the ticket were reduced, revenue decreased to BDTk. 56 lakh in 2019–2020 (The Daily Star, 2020a, 2020b). Many small and small & medium businesses have been formed around the archeological monastery of Paharpur. Various small business like restaurants, grocery stores, showpiece items shops, fancy goods stores and so on have been sprung up around the site. The destination has great appeals to visitors and it attracts visitors and tourists from home and abroad. Normally, more than one thousand visitors visit this destination every day and in winter season it's around three thousands per day (Sardar et al., 2020). The authors of this study have observed that the destination as well as the museum is beautifully decorated. The natural beauty around this monastery has been enhanced by the destination authority. The destination and its objects suffer from the problem like lack of information, scarcity of instruction, paucity of tour guide services etc. Visitors don't get enough and desired information from the visitation of the site. There is not enough information available on the physical site about the great monastery, as the artifacts and antiques of the monastery do not offer enough information to the visitors. Lack of instructions and tourist guides for proper visitation for the tourists are very apparent at the destination. Erosion of terracotta, ornamental terracotta plaques due to salinity, damp climate, lack of care and negligence also create the issue of sustainability of the second largest Vihara in the South Asia (2007; The Daily Star,

2020a, 2020b). The decay of walls and embellishments also causes the sustainability challenges of the destination. A site official anonymously argues that "from the original terracotta plaques, only 17 are demonstrated at the adjacent museum of the monastery while the rest are stored without proper care" (The Daily Star, 2020a). Proper maintenance and integration of the most advanced technological tools (AR, VR or MR) of tourism in the monastery can minimize the sustainability challenges. The destinations and museums like this in the different countries of the world are using AR and VR tools to provide more pleasant experience to the visitors (Han et al., 2014; Siang et al., 2019). Paharpur Buddhist Vihara can exploit the advantages of using advanced technological tools like AR and VR to differentiate and position itself from the other destinations in home and abroad.

Traditional Practices and Possibility of Modern Technologies

Generally, what do the managers practices at any archeological site for ensuring better visitors satisfaction? They give emphasize on managing the cleanliness, ensuring the aesthetic environment, displaying innovative and modern look and so on (Cianciarulo, 2015). That becomes the traditional practices in the developed countries. Visitors visit the archaeological destinations to know about the objects in details but in most cases which are not used in many developing countries like Bangladesh. Archaeological destinations are not only the representation of different collections of objects, statues and relics. Every object, statute, relic and terracotta has significance because that represents the history of a certain time. Even if any smallest object is present that also had been used at that time to perform specific task. Actually, now-a-days visitors would like to interact with the objects which mean "talk to". Direct interaction with the objects will fulfill the thirst of visitors. The question is how is it possible? Direct interaction with objects is possible with the help of the application of AR tools. The Paharpur Vihara has huge opportunity to use the AR applications. At Paharpur Vihara the authority maintains a good environment for visitors but lacks the information about the destination as well as the objects. In the present world, as part of their everyday interactions, visitors engage more with technological devices. This essentially provides the ground for the extension of technologically allowed destination management strategies (Neuhofer et al., 2012). There is currently no direct interaction with the Vihara objects, which is the present demand of tourists. To sustain in the competitive market, the Vihara has to adjust with the modern tools to provide direct interaction to the visitors. In the adjacent museum there are many old relics, statues and objects which are presented with some basic information but visitors want to know more. Visitors would like to know why and when the objects were used. What was the specific task of the objects? Protecting objects at any archeological site means that keeping the objects as it is. Reuse, modification or renovation of any of the object or instrument with historical value is impossible, so in this regard AR tool can be used to create new interactive services to the visitors (Cianciarulo, 2015). With the support of AR implementation

some interactive themes can be twisted at the Vihara. To fulfil the thirst of the visitors there is no alternative of the application of the modern tool like AR. AR development process and its possibilities and requirements are discussed at the following sections.

What Is Augmented Reality?

Although AR research has received attention since 1960s in the field of computer science, it's get less attention in the general field till 1999s due to the limitations of technological facility (Liang & Elliot, 2020). AR is an instrument that is used to improve the reality with virtual material. AR is basically the overlap of layers with information of various kinds such as videos, graphics and audios to the real world (Azuma et al., 2001; Chung et al., 2015; Cianciarulo, 2015; Kounavis et al., 2012; Milgram et al., 1995; Milgram & Kishino, 1994). AR might usually be described as the refinement of a real-world environment using textures of computer-generated images, videos, voices and texts via a device (Guttentag, 2010; Jung et al., 2018).

AR is a digital reinforcement of an individual's sense of sight and hearing that is frequently accessed through smart glasses (head-worn projective displays), laptops, computers, tablets and smartphones (Buettner, 2017; Carmigniani et al., 2011; Liang & Elliot, 2020; Rauschnabel et al., 2019). AR is portrayed as an application that adds the present reality with computer-made virtual objects that seem to exist together in the same space as the present reality (Azuma et al., 2001). In AR, for virtual-aligned wall projections on long spans or for 3D video mapping, see-through displays (electronic displays with real objects) or spatial augmented reality (SAR) are used (Loureiro et al., 2020). Over the real-world scenarios, AR also presents levels of virtual features like text, images and videos to the customers (Scholz & Smith, 2016).

Applications of Augmented Reality in Tourism Industry

AR applications have been using in numerous fields like marketing, retailing, education, event management, medical services, tourism and culture and so on (Cianciarulo, 2015; Han et al., 2017; Siang et al., 2019). The possible application of AR in tourism was recognized by tourism researchers and industry leaders as early as 2000 (Liang & Elliot, 2020). While AR has crossed the buzz stage, the technology is just about to be applied in the tourism industry in a significant way (Han et al., 2014). Technological advancement such as AR has become an important topic for tourism researchers, and the instrument is thriving, promising and increasingly applied in the field of tourism and culture (Han et al., 2014; Liang & Elliot, 2020; Siang et al., 2019; The Wall Street Journal, 2016; tom Dieck & Jung, 2015).

AR is applied in the People's Museum at Melaka (World Heritage City declared by UNESCO) in Malaysia. When the museum faced downward trend of visitors then they applied the AR tool to reboot the visitation towards the museum. In that museum AR mobile App was developed to enhance the visitors experience and to examine the user's acceptance towards the AR mobile App. The study reveals that 93.33% of the respondents had shown satisfactory travel experience when present objects are overlaid with virtual objects through AR mobile App (Siang et al., 2019). In the Dublin Heritage Trail, Ireland the AR application project based on smartphone was developed and user's acceptance also had been tested. In that study both GPS based AR and marker based AR were used (Han et al., 2014; tom Dieck & Jung, 2015). AR technology was also used in a number of potential urban heritage tourism destinations in Dublin (Han et al., 2017).

At the MUVIG museum in Italy the AR was used to change the usual perception and increase the awareness among the visitors. In that museum the researchers selected some objects and collected information about the objects. Then they created videos for the objects with relevant information and created a hidden layer visible with AR applications. The study used the free and famous software: Aurasma for AR application. At first visitors have to download and activate the software into android and then by activating the layer scanning QRCode, visitors can enjoy the computer generated objects with real objects in an exciting and interactive manner (Cianciarulo, 2015).

Several studies have been carried out to explore the development of visitor experience using AR by handheld and wearable devices (Chung et al., 2015; Han & Jung, 2018; tom Dieck et al., 2016). As the speed of AR growth hastens, cultural heritage sites have begun to concentrate on the opportunities offered by this modern and creative technology (tom Dieck & Jung, 2017). In cultural heritage tourism sites, AR is consistently used to maximize tourist positive experience (Jung et al., 2018). Mobile AR applications are developed and implemented at different cultural heritages sites as Deoksugung and Gyeongbokgung Palaces in South Korea, the British Museum in UK, An Post Museum in the Republic of Ireland, the Louvre in France in the last couple of years (Chung et al., 2015; Jung et al., 2018). At different cultural heritage tourism destinations, cross-cultural variations in the implementation of mobile augmented reality have also been addressed. In adopting the mobile augmented reality, the diverse cultural contrasts were analyzed (Jung et al., 2018). The results of the studies show that the aesthetic appearance and presence of AR have a big effect on perceived enjoyment. To digitally restore the old relics and precious statues, to re-create historical events and to prevent cultural heritage sites from decaying, AR is being used in the context of cultural heritage tourism extensively (Haugstvedt & Krogstie, 2012; Jung et al., 2018).

Many museums, archeological sites and cultural and heritage destinations are using digital spaces like AR to enrich visitors experience into something more interactive, amusing and exhilarating styles (tom Dieck & Jung, 2015). As AR is using the digital space to deliver supplementary value, it is also true that AR safeguards the sustainability of the heritage sites and their objects (Han & Jung, 2018).

Components of Possible Augmented Reality System
for Paharpur Vihara

The way users communicate and interact with the tourism environment has been modified by recent technological developments especially in mobile devices (Siang et al., 2019; tom Dieck & Jung, 2015). Young tourists have their smartphone and they use that device to interact with the environment throughout the information search stage to post purchase behavior. In this case AR can attract most of the young travelers. In a fun and engaging way, AR applications offer visitors the opportunity to get to know unknown environments. Overall, in order to create an enjoyable tourist experience, these newly developed applications aim to give tourists interesting and useful information (Jung et al., 2018). All themes regarding AR applications which are identified by the researchers of this study from extensive literature review are discussed with the stakeholders (visitors, young visitors and university teachers). Among the many tools of AR, AR mobile application seems viable to the stakeholders for this type of destination. AR mobile application is used in the People's Museum at Melaka in Malaysia and at the MUVIG museum in the Italy (Cianciarulo, 2015; Siang et al., 2019).

AR mobile application can be adopted by Bangladesh for the Paharpur Vihara. In that type of AR mobile application two important parts are integrated: (a) Development of AR mobile application; (b) Use of AR mobile application. In the first part destination authority will select objects/exhibits which will be scanned through 3D scanner to create digital versions of the objects. Then, considering the QR code a software development team will develop an AR application for smart devices like android or IOS. Finally, the app will be uploaded to the google play store. The second part is basically for the visitors. Visitors will download the AR mobile app from Google play store into their internet-enabled smartphone and activate the app. Then scan the QR code and the AR marker for watching videos with facts and figures. How the Paharpur Vihara authority can implement this type of AR mobile applications are figured out in the following:

Stage 1- Development of Augmented Reality Mobile Application for Paharpur Vihara

In the development of AR mobile application for the Paharpur Vihara, the destination authority should follow the subsequent steps:

(i) At first selected exhibits (terracotta, statues and relics etc.) in the Paharpur Vihara have to be scanned using a handheld 3D scanner to create its virtual forms.
(ii) Secondly, an AR mobile application has to be developed by a software team for creating AR applications for mobile devices while considering the QR code and AR marker.
(iii) Then the mobile app should be uploaded to google play store.

Stage 2- Use of Augmented Reality Mobile Application for Paharpur Vihara

In this part, the main duty goes upon to the visitors but destination authority will provide guidelines regarding the use of the AR Mobile Application for the destination. Here visitors will follow the following instructions:

  (i) Visitors will download the AR mobile App from google play store into their internet enabled smartphone;
 (ii) Activate the app;
(iii) Scan the QR code;
(iv) And scan the AR markers

Upon decoding the QR codes, visitors can watch videos which lead them to know more about the Vihara's exhibits and objects through display of facts and information (Cianciarulo, 2015). More delightfully, when the users scan the AR markers, they can see virtual elements being overlaid into the real world on their smartphone device. The mobile AR app helps them to communicate with old artifacts and objects and take photos (Siang et al., 2019).

Similar type of AR mobile app was used in the People's Museum at Melaka in Malaysia. For better understanding, the process of AR mobile app development for the museum is summarized in the below figure (Fig. 11.1).

User Requirement for Mobile Augmented Reality

As mobile AR is still known as a new tool in tourism industry user requirements are less identified and validated (Han et al., 2014). Past studies show that in any software and mobile computing devices user requirements are needed to be identified and validated before use (Gafni, 2008;Han et al., 2014 ; Zheng & Pulli, 2005). Previous studies proliferate the obligation to identify the user requirements for the newly developed mobile AR application. User requirements for the potential mobile AR applications should be simple with authentic user interface which indicates that software as well as the design interface will be simple (Han et al., 2014; Zheng & Pulli, 2005). The size of the software should be small and easy installation process will be required. Information should be sufficient and relevant and updated for the users of the application (Gafni, 2008;Han et al., 2014 ; Herzwurm & Schockert, 2003). Accessibility is another important user requirement for any software. The application software ought to be accessible and work on different platforms at anytime and anywhere (Han et al., 2014; Herzwurm & Schockert, 2003; Zheng & Pulli, 2005). Ease of use is a common key focus that would encourage the user to use the mobile app (Gafni, 2008; Han et al., 2014).

Now-a-days, citizens are more time-pressured than ever so the application should be efficient and less time consuming (Han et al., 2014; Zheng & Pulli, 2005). Safety and security measures must be considered in designing the application. It will not be appropriate to neglect safety and security concerns, and privacy should always be considered a priority (Gafni, 2008;Han et al., 2014 ; Herzwurm & Schockert, 2003). Product features and price are crucial factors in user requirements of any software.

Fig. 11.1 User Manual of the 'When History Comes Alive' AR Mobile App. (Source: Siang et al., 2019: p.4)

Table 11.1 User Requirements for Mobile AR. (Source: Adopted from Han et al., 2014: p.516; and focus group discussion of this study)

User requirements	Authors
Simple and authentic user interface	Gafni, (2008), Han et al., (2014), Herzwurm & Schockert, (2003) and Zheng & Pulli, (2005)
Small size and easy installation process	Han et al., (2014), (focus group discussion)
Sufficient, relevant and updated information	Gafni, (2008), Han et al., (2014), Herzwurm & Schockert, (2003) and Zheng & Pulli, (2005)
Accessibility	Han et al., (2014), Herzwurm & Schockert, (2003) and Zheng & Pulli, (2005)
Ease of use	Gafni, (2008) and Han et al., (2014)
Efficient and time saving	Han et al., (2014) and Zheng & Pulli, (2005)
Product features and price	Han et al., (2014) and Herzwurm & Schockert, (2003)
Social networking and interactivity	Han et al., (2014), Herzwurm & Schockert, (2003), focus group discussion

Therefore, in designing mobile AR application product features and its price should be considered (Han et al., 2014; Herzwurm & Schockert, 2003). It is expected that cost of using the potential mobile AR application will be reasonable. At present people expose themselves to various social networking sites such as Facebook, YouTube and Twitter (Pramanik & Rakib, 2020). Social networking becomes the new trend and obviously it's gaining the importance. As people would like to share their memorable things at social networking sites the software should have the capability of interactivity where people can watch the video, take picture with the objects and finally can share at social networking sites (Han et al., 2014; Herzwurm & Schockert, 2003). User requirements in the mobile AR can be summarized as follows (Table 11.1).

Methodology of the Study

This exploratory study focuses on implementation of AR technology at Paharpur Vihara which is a UNESCO proclaimed world heritage site in Bangladesh. At present the Vihara does not integrate any advanced tool like AR to display the objects. Written instructions through paper plaques and little descriptions on the objects are only guides for the visitors at this great Vihara. To attract more visitors, to ensure sustainability and to provide interactive experience the Vihara can be incorporated with the implementation of potential AR applications. In implementing innovations or new technological tools, it is crucial to involve the stakeholders to enhance the value and ensure effectiveness of the implementation (Hall & Bannon, 2006; Tipping et al., 1995; tom Dieck & Jung, 2017). Basically stakeholders are two types: internal stakeholders (employees, managers, owners) and external stakeholders (visitors, local community, government, suppliers, creditors) in the tourism industry

(Freeman, 1984; tom Dieck & Jung, 2017). Stakeholder approach has been taken in consideration to check the feasibility of innovation or new technological tool implementation in tourism industry (Freeman, 1984; Tipping et al., 1995; tom Dieck & Jung, 2017). This study has identified the perceptions (positive dimensions and challenges) of selected stakeholders regarding the implementation of potential AR applications at the Vihara. Through extensive literature review and discussion with experts as well as with the intuition of the researcher stakeholders of this study have been selected first. As this destination has not yet implement any AR tool, the concept of AR with written form (paper) and different video versions of AR applications in context of culture and heritage tourism were presented and elaborated to the stakeholders. After that they were asked to opine about their perceptions regarding potential application of AR at the destination. Then, qualitative data were collected through in-depth interview and focus group. The data were collected from five categories of stakeholders (officials of the destination, local community, university teachers, visitors and young visitors in between December 2019 to February 2020. After that the data were analyzed and sorted with the help of content analysis where researchers' judgment and existing literature act as a basis. Total numbers of 13 important informants were selected through theoretical sampling from the five categories of stakeholders for this study. In-depth interview with official (1), local community (3), visitors (3), and university teachers (3) were conducted rigorously. One focus group study was conducted among the young visitors (3). Summary of the methodology can be shown in the following way (Fig. 11.2).

Findings

Demographic Profile of the Respondents

This study is carried out in qualitative manner. This qualitative study has collected data from the five categories of stakeholders namely officer of the destination (OD); local community (LC), university teachers (UT), visitors (V) and young visitors (YV). From the OD category one officer from the destination was selected and in-depth interview was conducted. His age lies in between 30 to 39. From the local community category three respondents were selected and in-depth interview was directed. Both LC1 and LC2 are between the ages of 50–59 and their education level is SSC. LC3 is another respondent from the group of the local community whose age is between 30 and 39 years. Education level of LC3 is graduation. Three university teachers were selected by considering their research interest and in-depth interview was conducted. UT2 and UT3 both of their age ranges in between 30 to 39 years. UT1's age is in the range of 40 to 49 years. Three visitors from the category of visitors were selected and in-depth interview was taken. V2 and V3 both are graduates. V1's educational level is HSC and his age in between 20 to 29 years. Another special category is young visitors. Three participants were chosen from
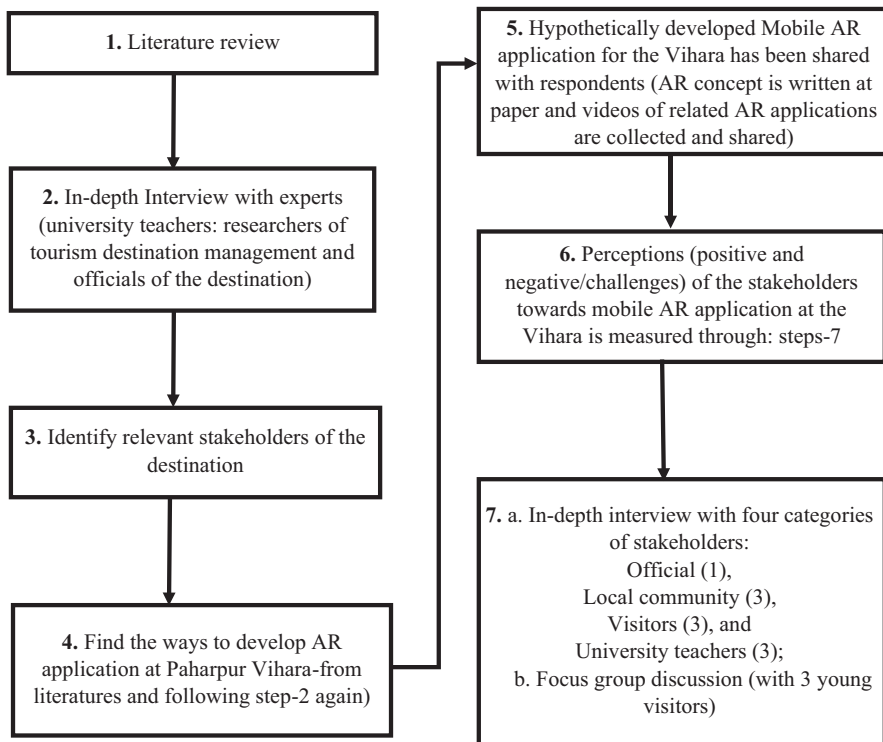
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┌─────────────────────────────────┐      ┌─────────────────────────────────────┐
│   1. Literature review          │      │ 5. Hypothetically developed Mobile AR│
└─────────────────────────────────┘      │ application for the Vihara has been  │
                 │                        │ shared with respondents (AR concept  │
                 ▼                        │ is written at paper and videos of    │
┌─────────────────────────────────┐      │ related AR applications are collected│
│ 2. In-depth Interview with      │      │ and shared)                          │
│ experts (university teachers:   │      └─────────────────────────────────────┘
│ researchers of tourism          │                        │
│ destination management and      │                        ▼
│ officials of the destination)   │      ┌─────────────────────────────────────┐
└─────────────────────────────────┘      │ 6. Perceptions (positive and        │
                 │                        │ negative/challenges) of the         │
                 ▼                        │ stakeholders towards mobile AR      │
┌─────────────────────────────────┐      │ application at the Vihara is        │
│ 3. Identify relevant            │      │ measured through: steps-7           │
│ stakeholders of the destination │      └─────────────────────────────────────┘
└─────────────────────────────────┘                        │
                 │                                          ▼
                 ▼                        ┌─────────────────────────────────────┐
┌─────────────────────────────────┐      │ 7. a. In-depth interview with four  │
│ 4. Find the ways to develop AR  │      │ categories of stakeholders:         │
│ application at Paharpur Vihara- │      │ Official (1),                       │
│ from literatures and following  │      │ Local community (3),                │
│ step-2 again)                   │──────│ Visitors (3), and                   │
└─────────────────────────────────┘      │ University teachers (3);             │
                                          │ b. Focus group discussion (with 3   │
                                          │ young visitors)                     │
                                          └─────────────────────────────────────┘
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Fig. 11.2 Summary of research methodology of the study. (Source: Authors' own construction, 2020)

that category and focus group discussion was guided. The age of the three participants ranges from 20 to 29, where two are male and one is female. All of them are graduates. Brief statistics regarding the participants of this study is summarized in below Table 11.2.

Perceptions Regarding Potential Mobile Augmented Reality Application

The researchers of this study have checked the perceptions of various stakeholders towards potential mobile AR applications at Paharpur Vihara. When perceptions were measured the following statement was kept in mind. The statement was following:

Statement "Viability/feasibility (whether implementation of the potential mobile AR application is possible or not) of the potential mobile AR project at Paharpur Vihara. And what will be the perceived benefits if AR projects are implemented

Table 11.2 Demographic profile of the respondents. (Source: Authors' survey, 2020)

Sl.	Categories of stakeholders and participants	Gender	Educational level	Age	Mode
1.	**Officer of the Destination (OD)**	Male	Graduate	30–39	In-depth interview
2.	**Local Community (LC):**				
	LC-1	Male	SSC	50–59	In-depth interview
	LC-2	Male	SSC	50–59	In-depth interview
	LC-3	Male	Graduate	30–39	In-depth interview
3.	**University Teachers (UT): (faculty members whose research interest lies in tourism destination management)**				
	UT1	Male	Post graduate	40–49	In-depth interview
	UT2	Male	Post graduate	30–39	In-depth interview
	UT3	Female	Post graduate	30–39	In-depth interview
4.	**Visitors (V):**				
	V1	Male	HSC	20–29	In-depth interview
	V2	Male	Graduate	30–39	In-depth interview
	V3	Female	Graduate	20–29	In-depth interview
5.	**Young Visitors (YV):**				
	YV1	Male	Graduate	20–29	Focus group
	YV2	Male	Graduate	20–29	Focus group
	YV3	Female	Graduate	20–29	Focus group

here? What will be the obstacles in case of implementing the potential mobile AR application at the Vihara".

The researchers of this study have discussed with the respondents (among the five categories of the stakeholders) through in-depth interview and focus group discussion by considering the above mentioned statement. Actually the discussion was semi structured in nature. Respondents also shared their views beyond the statement. Important and relevant data are incorporated and irrelevant topics are drop out from the study where researchers' judgment and intuition is used. Stakeholders' perceptions (positive vs. negative), challenges of implementing the potential mobile AR applications are expressed in the following sections:

Opinions of the Stakeholder- Officials   Firstly, an official of the destination was asked to express his opinion regarding feasibility of AR project at the destination. When the AR applications in context of cultural heritage tourism were presented to the officer of the Paharpur Vihara the officer anonymously said "It will provide exciting and interactive visiting experience to the visitors. It is a new technological tool that will be integrated with this destination". But he feels doubt about the implementation about the AR project at this destination because the destination suffers from the problem like negligence and carelessness. He shared his anxiety regarding the cooperation among the different departments and financial challenges to implement AR project here. Actually to implement AR project at this destination top down approach means from the Department of Archaeology (DoA) to regional authority and then to local authority directions and accordingly cooperation will be required. The official said "I am hopeful that if the top authority is informed and convinced about the benefits of the project they will take initiative to implement that type of innovative project which will ultimately revive the objects of the Vihara". Finally, he said "with the supports of government of Bangladesh it is possible to implement the AR project at Paharpur Vihahra". About the second part of the statement: what will be the perceived benefits if AR projects are implemented here? He opinioned that the precious objects of this destination will get relieves from the risk of repetitive human touch, decay or erosion. Digital version of the objects will be created. Aesthetic value of the objects will also be added.

Opinions of the Stakeholder- Local Community   Local community is another important stakeholder of the destination. The researchers have also conducted an in-depth interview with the three residents of the local area of the destination. At first they could not understand the theme of the AR. After clarifying the theme of the AR they said it is possible to implement the AR project at the destination but collecting and inserting all of the information regarding all the objects will be very difficult. LC3 said that objects of this destination are historical and older also; so getting all the reliable information regarding particular object and its use at that particular time will be very challenging. He also expressed that if AR project is implemented here young generations of the country will get enough opportunity to learn about this great monastery and Pala dynasty. LC1 stated that if AR is implemented at Paharpur Vihara the more visitors will be attracted and local economy will be flourished. Another respondent from local community LC2 stated that AR application will change the adjacent business positively and that will create employment opportunity also.

Opinions of the Stakeholder- University Teachers   In-depth interview from the three faculty members at university level who generally conduct research on tourism destination management are taken. All of the three faculty members shared the common challenges regarding implementation of AR project at Paharpur Vihara are: Funding difficulties, lack of coordination among different related departments and lack of concentration. UT1 indicated that getting attention from concerned authority will be challenging (Actually who will take the initiative to implement AR

at the destination?). UT2 and UT3 also specified another challenge that the integration of technology with the physical objects will require accurate and reliable information. UT3 also mentioned the challenge about language barriers. For international tourists' digital presentation of the objects should be in English and for the local the language should be the mother tongue Bangla. In developing AR applications Languages of the communication should be kept in mind by the programmers. UT3 indicated that if AR is applied in the destination many uncared (without proper care) objects will get attention. UT3 also concerned about availability of efficient manpower and technology; as the implementation of AR at this destination will requires expertise knowledge and technological knowhow of related foreign experts. UT2 said that many of the visitors may not be attracted to the AR application due to technological inefficiency. He also mentioned that it will attract foreign tourists. "Local tourists may not engage themselves to the AR applications due to their attitudinal problem and due to slow adoption rate of technology" added UT2. All three faculty members agreed that digital custody of the objects will be created and the objects of the destination will escape from the erosion, permanent losses and salinity problem. "With the application of AR, the arts, culture, traditions and practices of the Buddhists at that time will be protected and expended for the learning of the new generation"-said UT3. Regarding the perceived benefits almost all of them shared the same things. They mentioned from the AR implementation economic, social, experiential, aesthetic, and educational value will be enhanced. "All stakeholders will be benefitted from the implementation of the AR"- said UT2. UT3 also mentioned the point that AR implementation will reinforce the sustainability of the destination.

Opinions of the Stakeholder- Visitors Visitors are the central part of any destination. Actually visitors make a destination lively. The researchers of this study conducted in-depth interview with the visitors also. V1 said it will be very enjoyable and exciting. V2 stated that AR application will bring live into the deceased objects. "The visiting experience will be more interactive"- agreed by V1, V2 and V3. V1 said that many visitors will not have the ability to access into the digital application due to lack of smart device, lack of technical knowledge and so on. In this regard tourist guides and technical facilities should be made available; otherwise many visitors will become frustrated. "Especially for children and less educated people technical facilities should be ensured by the destination authority"-said V1. V2 mentioned that many objects of this destination become gloomy and unclear. If AR is applied, then the gloomy objects become transparent in digital platform. "It will enrich our memories and ensures interactive learning"-stated V2.

Opinions of the Stakeholder- Young Visitors Young generations are very much tech-friendly and technology oriented (Hence, 2018). In tour and travelling, the young generations are more interactive with technological devices like smartphone, camera and HMD (Head-Mounted Device) and so on. The researchers of this study have taken an opportunity to conduct a focus group discussion among the three young visitors (who are the university students at graduate level). In the discussion

period they were presented with different examples of AR applications in the context of cultural and heritage destination. Then their perceptions regarding AR implementation were checked. YV1 said that really it will be an exciting way of visitation and it will create strong psychological and emotional attachment. "AR implementation will attract more visitors"- Said YV2. YV2 also stated that this application will increase the curiosity among the visitors and attract new visitors. "AR application will help to learn easily and interactively"- stated YV3. All of the three young visitors said that they are very enthusiastic about the new technology like AR. They agreed that if AR is implemented, young generations will be highly attracted to this destination. "As in physical environment it is strictly prohibited to touch the objects and take picture, AR will resolve the issues at some extent" added YV3.

Through the technique of content analysis, the researchers of this study summarized all of the findings into a structured format where we can find the findings easily. The summary is shown in the below Table 11.3.

Discussion on Findings

This qualitative study has explored five positive perceived benefits which are shown by different stakeholders of the destination towards the potential mobile AR application at Paharpur Vihara. Positive perceived benefits are economic value, experiential value, aesthetic value, historical & cultural value and educational value. This study also explored some negative perceptions basically those are challenges impeding the implementation of mobile AR application at the destination. The challenges are management challenges, visitors' incapability, financial challenges and informational challenges. If mobile AR application is implemented at the destinations the visitors of the destination will get a lively and interactive environment for their visitation which actually enhances the experiential value. These findings are also supported by previous studies (Gordon et al., 2015; tom Dieck & Jung, 2017). With the implementation of mobile AR application new visitors and young visitors will be attracted and local business and employment opportunity will have flourished. That means economic value will be accelerated. This finding is matched with the findings of the prior studies (e.g.Gordon et al., 2015 ; Jiang & Kim, 2015 ; tom Dieck & Jung, 2017). Sustainability of the destination will be ensured and local culture, history and traditions will be protected (UT3). Similar findings are established at the studies of the earlier researcher (tom Dieck & Jung, 2017). Interactive learning and easy to learn will be possible with the help of AR application which indicates the enhancement of educational/learning value. Learning value is increased with the use of AR application in cultural and heritage tourism context is found in other research studies also (Gordon et al., 2015; tom Dieck & Jung, 2017). New technology will be integrated and old objects will get the newer versions in the virtual platform which will enhance the aesthetic value of the destination. AR tools also helps in modification of the objects in digital platform obviously without

Table 11.3 Stakeholders' perception dimensions and sub-dimensions with challenges and values with literature studies. (Source: Authors' survey and literature review, 2020)

Perceptions towards AR	Sub-dimensions	Stakeholders	Value	Existing literatures
Positive dimensions	Exciting	OD,V1, YV1	**Experiential value**	Gordon et al. (2015) and tom Dieck and Jung (2017)
	Interactive	OD, V1, V2, V3, YV3		
	Lively	V2		
	Enthusiastic	YV3		
	Enrich memories	V2		
	Emotional attachment	YV1		
	Psychological attachment	YV1		
	Local economy	LC3	**Economic value**	Gordon et al. (2015), Jiang and Kim (2015) and tom Dieck and Jung (2017)
	New visitors	LC1, YV2		
	Young generations	YV3		
	Local business	LC2		
	Employment opportunities	LC2		
	New technology	OD, YV3	**Aesthetic value**	Gordon et al. (2015), Jiang and Kim (2015), and tom Dieck and Jung (2017)
	Aesthetic value	OD		
	Curiosity to new technology	YV2		
	Escape from erosion	OD, UT1, UT2, UT3	**Historical and cultural value**	tom Dieck and Jung (2017)
	Digital creation	OD, V2, UT1, UT2, UT3		
	Escape from permanent losses	UT1, UT2, UT3		
	Sustainability	UT3		
	Protection of arts, traditions and culture	UT3		
	Getting attention	UT3		
	Learning	LC3, UT3, YV3	**Educational/ learning**	Gordon et al. (2015) and tom Dieck and Jung (2017)
	Opportunity to learn	LC3, UT3, YV3		
	Easy to learn	YV3		
	Curiosity to learn new things	YV2		

(continued)

Table 11.3 (continued)

Perceptions towards AR	Sub-dimensions	Stakeholders	Value	Existing literatures
Challenges	Carelessness	OD, UT1	**Management challenges**	Fritz et al. (2005)
	Negligence	OD, UT1		
	Lack of cooperation	OD		
	Lack of concentration	UT1		
	Lack of efficient manpower	UT3		
	Lack of understanding	LC1, LC2, LC3,	**Visitors incapability**	Han et al. (2014) and Pang et al. (2006)
	Language barriers	UT3		
	Inability of visitors	V1, UT2		
	Visitors unwillingness	UT2		
	Funding difficulties	UT1, UT2, UT3	**Financial challenges**	Fritz et al. (2005)
	Lack of technology	UT3		
	Technical instrument supports from the destination	V1		
	Lack of reliable information	LC3, UT3	**Information challenges**	Survey
	Collecting reliable information	LC3, UT2, UT3		
	Inserting information	LC3, UT2, UT3		

compromising the original objects as it is. This finding also reveal same with the existing literatures (Gordon et al., 2015; Jiang & Kim, 2015; tom Dieck & Jung, 2017). This study could not find ecological value, functional and strategic value of AR application at a site like Paharpur Vihara although previous studies revealed such findings (tom Dieck & Jung, 2017).

Besides the positive dimensions of the perception of the stakeholders there are some negative dimensions towards the potential mobile AR application. The respondents also show the challenges that might have to be faced in implementing the mobile AR application at the destination. By classifying the sub-dimensions of negative perception four main challenges are identified which are management challenges, visitors' incapability, financial challenges and informational challenges. Implementing AR application in developing countries like Bangladesh is not easy task. Lack of cooperation and concentration from the concerned authority may challenge the implementation of AR application at the destination (Fritz et al., 2005; OD, UT1, and UT3). Visitors' unwillingness and their incapability to access modern technology may create another challenge for implementing AR at the destination (Han et al., 2014; Pang et al., 2006; V1 and UT2). Fund raising difficulties may prolong the implementation of the AR application (Fritz et al., 2005; UT1, UT2 and UT3). Getting reliable and relevant information regarding each and every object at

the destination will be very tough and become impossible in some extent (LC3, UT2 and UT3). This will create informational barriers to apply the AR project at the Vihara. Maximum studies are carried out to find out the potential benefits and very few studies are carried out to find out the challenges to implement AR application in tourism industry. Therefore, the findings of the study regarding challenges of AR implementation will act as guidelines for the destination managers, policy makers and marketers to develop and implement their AR strategies to provide exciting visiting experience.

Technology Supported Tourism Tool as Augmented Reality and Sustainability

Innovative and interesting technological applications have emerged in recent years within the tourism industry. The introduction of new technology has led to rapid and significant changes in the use, supply and conservation practices of the tourism sector, especially in the fields of culture and heritage tourism (Pietro et al., 2018; Ramos-Soler et al., 2019). In tourism, AR is a promising key contributor to sustainability (Han et al., 2014; Yung & Khoo-Lattimore, 2017). Mobile technology application in tourism industry generates creative experiences for customers, enhances a sustainable competitive advantage and brings sustainability to tourism (Kim & Kim, 2017; Koo et al., 2017). AR provides a mixing of the experience of real environment with computer generated environment to the visitors (Azuma et al., 2001; Chung et al., 2015; Kounavis et al., 2012; Milgram et al., 1995; Milgram & Kishino, 1994). Without hampering the real setting the AR applications are adopted to enhance the value of existing environment which is the main concern of sustainability. AR does not only provide benefits to the visitors it also provides benefits to the stakeholders. Local community gets the benefits of employment opportunities, development of SMEs and modern infrastructure (Han et al., 2014). AR applications brought back the historical objects, buildings, culture, traditions and customs to the real life through re-enactment of the old events and their significance (tom Dieck & Jung, 2017). With the implementation of AR technology, the digital version of a destination and its objects can be created which will actually fulfill the needs of future generation without comprising the needs of present generation, clearly fulfilling the generally accepted preconditions of sustainability. Through the capacity of enhancing experiential, economic, education, historical & cultural and aesthetic value the AR is ultimately enhancing the sustainability of the tourism industry.

Conclusion and Recommendations

In today's world, as part of their everyday experiences, travelers engage more with technological devices. In reality, this creates the basis for the expansion of technologically facilitated tourist destinations (Neuhofer et al., 2012). In order to attract visitors from home and abroad the authorities of the archeological and heritage sites require constant investment in new technology like AR into the industry. Especially the AR mobile based applications have been adopted rapidly in the cultural and heritage destinations (Fritz et al., 2005; Han et al., 2014). In this study it is found that the stakeholders have positive perception towards the implementation of potential mobile AR application at the Paharpur Vihara. The stakeholders stated that if AR is adopted at the destination the value of the destination will be enhanced through the enhancement of the economic, experiential, cultural & historical, educational and aesthetic value. The stakeholders also expressed some challenges that might have to be faced by the managers and authority of the destination to implement the potential mobile AR application. Lack of enough funding opportunities will be the great challenge as like as many destinations around the world for implementing the AR project at the destination. Proper communication among concerned authorities, government and relevant stakeholders may mitigate the financial challenge. Another challenge is management challenges which show the lack of cooperation, lack of attention to the destination from the concerned authority which may hinder the implementation of AR application. This study also reveals that incapability or unwillingness of the visitors to use the new technology will create another obstacle in implementing the AR project. Slow adoption rate with innovation in our country may prolong the acceptance time of the project. In this case at the beginning period of the implementation visitors should be encouraged and trained up through efficient tour guides. Destination authority may appoint some technical personnel to implement the AR project. Knowledgeable personnel or experts from foreign countries experienced in managing AR at heritage sites could be hired for collecting and inserting the reliable information into the objects. Although there are some challenges to implement the project at the destination but it is not impossible to apply AR projects in Paharpur Vihara because of its promising future. The AR tool has high potentiality in tourism industry due to its practical usefulness and benefits. In near future it will be used extensively in the tourism industry to offer exciting and lively environmental setting with real world to the visitors. In future the AR will bring many new features to it users also. As interest towards AR is growing Brain-Computer Interfaces (BCI) and nanotechnology applications with AR will be used in future. AR will become wearable devices (Loureiro et al., 2020). In future the AR will be used as a strategic tool for planning, managing and promoting the tourism industry of Bangladesh.

Limitations and Future Research Directions

With in-depth interview and focus group discussion, this qualitative study was carried out where only thirteen participants from five stakeholder groups were selected. The respondents are very small in number. Only one respondent was taken from the category of official of the destination, while this study may include more concerned authorities of the destination in the study. In the study the authors found no implementation of AR application at the destination. But this study has carried out to measure the perceptions of the stakeholders towards the implementation of potential mobile AR application with the help of hypothetical or simulated mobile AR application which may not reflect the actual representations. In the future, the perception of AR applications can be assessed by practically applying the AR application on a limited number of objects at the destination. Quantitative studies can be conducted by taking into account all the dimensions and sub-dimensions of the perceptions of mobile AR application identified by this survey. Besides, due to differences in gender, educational level, age group and types of stakeholders, perceptions reflected in this study of AR applications may differ.

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