RESEARCH ARTICLE

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NATURAL RESOURCES AND ENVIRONMENT

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Smart Tourism Development for Recreation in Pesanggrahan Sangga Buana Urban Forest, South Jakarta

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Abstract

Urban forest is a form of green open space in the urban area. The use of information and communication technology based on smart tourism is an important factor in providing facilities for recreational areas. This research aims to formulate smart tourism-based development at Pesanggrahan Sangga Buana Urban Forest for recreation based on resources, management and preferences of visitors and the surrounding community. Data collection methods used were literature studies, field observation, questionnaires, and interviews. The data analysis used were qualitative, quantitative descriptive, and SWOT. Pesanggrahan Sangga Buana Urban Forest (PSBUF) has the potential to develop smart tourism-based facilities for recreation. Standard recreational facilities are available in the form of prayer rooms, toilets, gazebos, jogging tracks, parking lots, badminton courts and football fields. Urban forest management is carried out by Sangga Buana Environmental Farmers Group with supervision by the Parks and Urban Forest Service of Jakarta Special Capital Region. Sangga Buana Environmental Farmers Group strives to preserve the environment in the Special Capital Region of Jakarta area with facilities that do not disturb the surrounding ecosystem. The existence of jogging tracks and sports fields is still lacking. The biggest motivation for visiting the urban forest is to refresh the mind from daily boredom. Public facilities that are really needed are rubbish bins. Respondents need for smart tourism facilities in the form of Closed Circuit Television is the highest. Recommendations for the development of facilities are optimizing potential, maximizing management cooperation, increasing PSBUF promotions, and optimizing coordination between managers.

Keyword: facilities, recreation, smart tourism, urban forests

1. Introduction

Urban forests are a form of green open space in urban areas. According to Government Regulation Number 63/2002 concerning Urban Forest [1], an urban forest is a stretch of land covered with trees that are combined and dense within an urban area on state land or private land and is designated by authorized officials as an urban forest. The existence of urban forests is very important because it has multiple benefits in nature conservation in the form of preserving flora and fauna in urban areas, ecologically in overcoming the negative consequences of urban development, such as sea water intrusion, increasing aesthetics, recreation, improving community welfare, and education and training [2,3]. Urban forests are utilized without disturbing their functions. This function can attract urban residents to visit urban forests [4,5]. The uniqueness of this urban forest is due to its location in densely populated cities, which has a direct impact on the lives of urban residents. In addition, the most important role of the urban forest function is the view of the urban forest, which is attractive [6].

Dense activities of urban communities, fast-paced demands, and environmental conditions that are often less conducive can cause stress. Recreation is an alternative solution to overcome these negative impacts. Urban forests with various functions, such as beauty, audiality, and thermal comfort, can be used for recreation [7]. Recreation can refresh the mind so that it can restart activities.

Recreational facilities can help visitors meet their basic and special service needs when carrying out recreational activities [8]. The use of information and communication technology

is an important factor in providing facilities in urban areas. The use of information technology will make it easier to design, access, and disseminate information for various purposes without space and time limitations, including recreation, called smart tourism. This activity involves the development of information and communication technology infrastructure, the use of cloud computing, the Internet of Things, end-user internet services, and data analysis technology for recreational purposes [9].

Smart tourism combines the use of information and communication technology to enable visitors to have valuable experiences. Technology maximizes tourist services and plays an important role in all tourist trips [10]. This concept creates an innovative tourist area by facilitating integrated visitor interaction with the surroundings through the convenience and sophistication of technology [11]. Pesanggrahan Sangga Buana Urban Forest (PSBUF) is one of the urban forests that can be used for recreation. The PSBUF already has standard facilities for recreational activities in general, but smart tourism-based facilities have not been optimally developed. This research aims to formulate smart tourism-based facility development for recreation by considering biophysical conditions, existing management, and preferences of visitors and surrounding communities.

2. Materials and Methods

The research was conducted in the PSBUF, South Jakarta, between February and May 2023. The tools used were writing instruments, voice recorders, cameras, dry-wet thermometers, questionnaires, and interview guides. The types of data taken were secondary data and primary data.

A literature review was carried out to obtain data and information regarding the condition of urban forests in the form of documents related to the PSBUF and other data that support research. Field observations were carried out by walking through (exploring) the urban forest area and then observing and recording the results. Field observation data were obtained in the form of the biophysical conditions of urban forests, including microclimate, flora, and fauna. Temperature and humidity data were collected using a dry-wet thermometer in the morning (06:00 West Indonesian Time), afternoon (12:00 West Indonesian Time), and evening (16:00 West Indonesian Time) for three days. Questionnaires were administered from visitors (31 people) and the surrounding community (30 people). Respondents from the surrounding community were people who live in the Jalan Karang Tengah area, while visitor respondents were people who live outside Jalan Karang Tengah. Taking target respondents using accidental sampling techniques. This technique determines respondents from a sample of people who are accidentally met and it is considered that these people are suitable as data sources [12]. The specified criteria for respondents were visiting PSBUF directly and being ≥17 years old. Questionnaires were used to obtain data on respondent's characteristics, motivations, and preferences. Interviews were conducted with urban forest managers, namely the Sangga Buana Environmental Farmers Group and staff of the Special Capital Region of Jakarta Parks and Urban Forest Service. Interviews were conducted to obtain data regarding management that has been, is being, and will be carried out in urban forests.

Formulation of development recommendations using qualitative and quantitative descriptive analysis, as well as SWOT (Strength-Weakness-Opportunity-Threat) analysis. Qualitative descriptive analysis is carried out to understand social phenomena by thoroughly describing the data that has been presented using narrative words and reporting in detail from the source [13]. Quantitative descriptive is used to describe data results and draw conclusions using numbers. The SWOT analysis consists of strengths which are conditions of excellence possessed by urban forests, weaknesses are conditions of deficiencies which must be immediately overcome because they are detrimental to urban forests, opportunities are conditions which can be exploited so that they can develop in the future, and threats is a threatening condition from outside that can disturb the urban forest [14].

3. Results and Discussion

3.1. Resources of Pesanggrahan Sangga Buana Urban Forest

Pesanggrahan Sangga Buana Urban Forest has an area of 5.4 ha located in Lebak Bulus Village, Cilandak District, South Jakarta. Lebak Bulus Street, Villa Cinere Mas Street, and Merawan Street are the alternative roads to PSBUF. After passing through one of those three alternative roads, visitors can access PSBUF through Karang Tengah Raya Street, then to Taman Sari I Street. However, the access to the main entrance of the urban forest on Taman Sari I Street is adjacent to the residential area, which can only be accessed using small private vehicles such as cars and motorbikes.

Pesanggrahan Sangga Buana Urban Forest (PSBUF) was first planted by a local resident named Babeh Idin together with the Sangga Buana Environmental Farmers Group (EFG). This urban forest is used as a conservation, education, and nature-based tourism area. The facilities available at PSBUF are prayer rooms, toilets, gazebos, jogging tracks, parking lots, as well as sports fields in the form of badminton courts and football fields quite large. An interesting object is the globe symbol surrounded by pillars and buildings made in typical Betawi style. The average daily air temperature is 31°C with an average daily humidity of 73%. The topography in the urban forest area includes steep and sloping contours.

The animals found were dominated by bird species, including the Eurasian Church (*Passer montanus*), the Common Turtle Dove (*Streptopelia chinensis*), and the Cucak Kutilang (*Pycnonotus aurigaster*). There are also mammals such as coconut squirrels and insects in the form of butterflies. PSBUF is on the banks of the Pesanggrahan River, so the most common species of plants found are bamboo and fruit trees which can be used by the surrounding community. The bamboo root system is broad, dense, strong, and can accumulate litter, causing the soil structure to become strong and preventing erosion because it grips soil particles that enter the river body [15]. In addition, there are also coffee plants which initially was a trial plant to then be a vital plant due to its suitability with the surrounding environment. With the existence of coffee plants, PSBUF can be developed as an urban agroforestry. The visual potential is in the form of views of the surrounding urban forest, while the less good visual potential is burnt buildings that have not been repaired and used cages that are no longer in use.

3.2. Management of Pesanggrahan Sangga Buana Urban Forest

Pesanggrahan Sangga Buana Urban Forest is managed by the Sangga Buana Environmental Farmers Group (EFG). Sangga Buana EFG strives to preserve the environment of the Special Capital Region (SCR) of Jakarta. Based on the Governor Regulation (2019) [16], urban forests are under the supervision of the Parks and Urban Forest Service of Jakarta SCR, Forestry Sector. There are 25 PSBUF officers, 11 of whom are officers from the Parks and Urban Forest Service of Jakarta SCR and 14 others under Sangga Buana EFG. The policy implemented by the urban forest manager is giving natural charity by spreading fish seeds in the river and planting trees for visitors after carrying out activities. The management has not yet made a master plan for long-term management of PSBUF. Short-term planning is being carried out regarding public facilities, namely repairing fishing ponds which have not been managed since Covid-19 and installing garden lights.

3.3. Motivations and Preferences of Visitors and Surrounding Communities

3.3.1. Characteristics of Respondents

The age characteristics of visitors are dominated by late teens (38.71%), while the surrounding communities were older (30%). Recreational activities in the urban forest for teenagers can influence a person's psychology to be more productive and enthusiastic [17], while for the local communities, PSBUF is a place to fill free time without costs close to home. The majority of visitors were female (54.84%) because they took their children to the event, while the majority of the surrounding community were male (53.33%) because they came to the urban forest to fill their free time such as exercising. The highest level of education for visitors (67.74%) and the local communities (63.33%) was high school. Most visitors visit intensity for the first time (54.84%) and local communities visit every day (60%). This is

because the first-time visitors go to the urban forest is to attend an event, whereas the location of the urban forest is close to the homes of local people so they can be visited every day.

3.3.2. Motivations and Preferences of Respondents

Motivation is important in making the decision to visit a destination urban forest [18]. Most visitors chose the motivation to attend the event (20.88%) because they used the urban forest as a place to hold the event. Most local communities have the motivation to refresh their minds (23.91%) in the urban forest. This is because people need to refresh their minds from boredom after carrying out various daily activities. Motivation causes a person to be driven by the desire to visit and carry out activities in the urban forest. This causes the trend of urban community activities in urban forests to increase.

Preference is a person's attitude tendency in making choices that vary based on desires, interests, and preferences. Preference assessments regarding public facilities are divided into comfort, cleanliness, health, security, and access [19,20]. The respondent's preferences analyzed were public facilities (Table 1) and smart tourism-based facilities that they wanted to develop (Table 2).

Table 1. Respondent's preferences for public facilities

Public facilities	Visitors (%)	Surrounding communities (%)
Jogging track	6.59	5.30
Benches and tables with shade	10.78	9.09
Park bench	5.39	6.82
Garden lights	5.99	11.36
Photo landmark	1.80	1.52
Sink	7.19	4.55
Rubbish bin	**11.38**	**14.39**
Road sign	5.39	1.52
Disabled friendly facilities	2.99	2.27
Restaurant	6.59	2.27
Playground	3.59	12.88
Gazebo	9.58	13.64
Parking lot	4.19	1.52
Toilet	5.99	3.79
Prayer room	5.39	1.52
Security posts	6.59	5.30
Advisory sign	0.60	0.00
Sports facilities	0.00	1.52
Interpretation board	0.00	0.76

Most of the respondents preferred public facilities in the form of rubbish bins. Rubbish bins in the urban forest have been provided by the management but are still considered inadequate by respondents and there are rubbish bins for sorting, but the only thing left is the lid, so a lot of rubbish is scattered around the urban forest. Disabled-friendly facilities are chosen by few people because their needs are not given enough attention. Presidential Regulation Number 59/2017 concerning Implementation of the Achievement of Sustainable Development Goals emphasizes sustainable development goals for everyone without leaving certain parties behind in achieving them, including people with disabilities. The global target by 2030 is to provide public spaces and green open spaces that are safe, inclusive, and easily accessible, including for people with disabilities.

Table 2. Preferences for smart tourism facilities

Smart tourism facilities	Visitors (%)	Surrounding communities (%)
Free wifi	19.30	23.46
QR Code	11.40	9.88
Mobile application	3.51	6.17
Virtual reality	3.51	1.23
Educational video screen	13.16	4.94
USB port	**21.05**	20.99
Digital interpretation board	7.02	7.41
CCTV	**21.05**	**24.69**
Digital map	0.00	1.23

A USB port is a place used to insert smartphone cables. Currently, USB port are often found in public places such as train stations which provide free charging services. The way to connect a smartphone to a USB port is very easy, namely by inserting the cable that has been connected to the smartphone into the USB port. The need for a USB port was stated by 21.05% of visitors.

The need for CCTV was stated by 21.05% of visitors and 24.69% of the local communities. CCTV (Closed Circuit Television) is a surveillance camera that can record things around you to prevent crime from occurring. The existence of CCTV can monitor the condition of the surrounding environment in real time for 24 hours. This provides a sense of security and comfort for people who come to the urban forest. Apart from that, the existence of CCTV also functions to monitor the area around the houses of the surrounding community. CCTV cameras can play a role by carrying out independent monitoring and then the data will be connected to a central server.

3.4. SWOT Analysis for Smart Tourism Development

Pesanggrahan Sangga Buana Urban Forest has the potential for smart tourism-based recreation. The results of the SWOT analysis and development strategy are presented in Table 3.

Table 3. Matrix of smart tourism-based recreation development strategies at PSBUF

External / Internal	Opportunity	Threat
	1. The trend of community activities in urban forests is increasing 2. The number of information and communication technology users increases 3. The high demand for smart tourism-based facilities 4. Availability of a YouTube channel	1. There is potential for land conversion 2. Potential for traffic jams 3. The price of information and communication technology is increasing 4. The security of smart tourism-based facilities is not guaranteed
Strength 1. Natural conditions in the middle of urban areas 2. Interesting PSBUF story 3. The sports field is large enough to accommodate a large number of participants 4. Free wifi is available 5. There is coffee that grows abundantly in urban forests	**SO Strategy** Optimizing the potential of urban forests for recreation 1. Installation of digital interpretation board (S1, S4, O2) 2. Development of tourist attractions (S2, S3, O1) 3. Installation of educational video screens (S5, O3)	**ST Strategy** Maximize management cooperation 1. Collaboration among urban forest officers by utilizing technology (S1, S2 S3, S4, S5, S6, T1, T2, T3, T4)

External / Internal	Opportunity	Threat
	1. The trend of community activities in urban forests is increasing 2. The number of information and communication technology users increases 3. The high demand for smart tourism-based facilities 4. Availability of a YouTube channel	1. There is potential for land conversion 2. Potential for traffic jams 3. The price of information and communication technology is increasing 4. The security of smart tourism-based facilities is not guaranteed
Weakness 1. Limited facility management 2. Urban forests have not yet become a top management priority in Jakarta 3. Cooperation between urban forest managers is not optimal 4. Human resources are not yet supportive 5. Knowledge about smart tourism is low 6. Access road to the narrow urban forest and in the middle of residential areas 7. There is no urban forest website yet 8. CCTV is not yet available 9. There is no electricity available for visitors 10. The jogging track area is slippery and has holes	**WO Strategy** Increase promotion of PSBUF to urban residents 1. Urban forest management for repeat visits (W1, W2, W3, W4, O1) 2. Creation of mobile applications that are integrated with various features (W5, W6, W7, O2) 3. Installation of CCTV that can be accessed by visitors (W8, O3) 4. Added USB Port in urban jungle (W9, O2, O3) 5. Creation of smart tourism development pathways (W10, O1)	**WT Strategy** Strengthen legal regulations and optimize the use of infrastructure and facilities 1. Making regulations prohibiting land conversion (W1, W2, W3, T1) 2. Use of environmentally friendly vehicles (W6, T2) 3. Maximize the use of technology for society (W7, W8, W9, W10, T3) 4. Installation of instruction boards for using smart tourism facilities (W4, W5, T4)

The facilities developed are onsite smart tourism-based facilities. This facility can be used directly by visitors who access the urban forest. The existence of onsite facilities involves direct interaction between visitors and the urban forest. Procurement of smart tourism-based facilities is carried out by urban forest managers.

3.5. Directions for Smart Tourism Development

3.5.1. Optimizing the Potential of Urban Forests for Recreation

Digital interpretation boards are technology-based electronic media that are used to provide the information needed for visitors. This board is a web-based device that is implemented on localhost and displayed on an LCD screen [21]. This digital device displays information installed indoors and outdoors so that information can be conveyed to visitors. Dynamic board design display with remote control via internet network [22]. Digital interpretation boards are used as digital media to display special information for education regarding urban forests and existing vegetation. The technique used is non-personal interpretation or does not involve a guide but uses media in the form of an interpretation board to introduce the object of interpretation [23]. Visitors can use the interpretation board media independently without a guide. This board uses an LCD screen so updates via a computer are easy to do because there is no need to remove a new board. This information tool is combined with a QR Code which can be integrated with a QR Code scan from the mobile application (Figure 1).
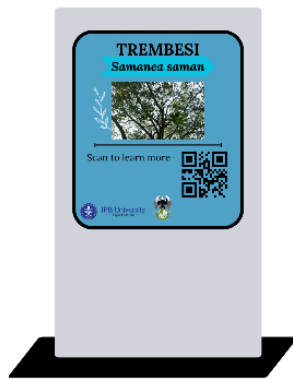
Figure 1. Digital interpretation board design

Wifi (Wireless Fidelity) is a technology used to exchange data wirelessly using electronic equipment. The electronic equipment used, such as computers or smartphones, is then connected to the internet network via wifi at the access point [24]. The existence of free wifi is one of the technological foundations for the smart tourism destination dimension [11]. Free wifi can be used by urban forest visitors to share experiences during their visit and easily access the information they need [25].

Smart tourism facilities in the form of free wifi have been provided at PSBUF. Free wifi is a program provided by the SCR of Jakarta Provincial Government to provide free internet services. The program to expand internet access for the community is in the form of "JakWifi - Internet for All". This service installation for the people of Jakarta SCR was carried out during the Covid-19 pandemic. One of the priority locations for installing JakWifi is parks and urban forests. This refers to the Regulation of the Governor of the Special Capital Region of Jakarta Number 82/2021 concerning Expanding Internet Access for the Community. The wifi provided can be used to access the QR Code on the digital interpretation board.

A tourist attraction is a thing, place, or activity that is packaged and shown to have an attraction so that people are interested in visiting the area and impress visitors [26]. Urban forests can be used as natural urban recreation destinations. One of the goals of urban forests is to increase the interest of urban residents in carrying out recreational activities away from their busy daily lives. This has led to an increase in the number of urban community activities in urban forests [27]. The development of attractive tourist attractions will increase the trend of community activities in urban forests. A form of tourist attraction that can be developed is natural education in the PSBUF. The first thing to do is present material introducing bamboo and its benefits for rivers, then visitors are invited to plant bamboo. Next, visitors and managers went along the Pesanggrahan River while cleaning the river from rubbish.

Video is a form of publication to provide information about recreation areas. The existence of videos that combine text, audio, graphics, and visuals can be interesting and provide knowledge for visitors [28]. The videos shown are short videos showing the beauty, uniqueness, potential, and atmosphere of the recreation area. Delivery of a good video with a storyline like an informative film [29]. Videos from interesting YouTube channels can be used to be installed on the video screen (Figure 2). One of the educational videos that can be shown at PSBUF is about coffee that can grow well in the urban area of South Jakarta, starting from land preparation to harvesting. This can be educational for school children who come to PSBUF.

Figure 2. Educational video screen design

3.5.2. Maximizing Management Collaboration

Collaboration between urban forest officers with visitors and surrounding communities can take advantage of the use of technology. Management communication improvements can be made via mobile applications. Criticism and suggestions from urban forest visitors as material for consideration in developing smart tourism urban forest facilities in a sustainable manner can also be done via a mobile application. Activities with a large number of participants can cause changes to the natural conditions of urban forests. After development is carried out, maintenance is needed for the sustainability of the urban forest. One of the important variables that influence the sustainability of urban forests is the involvement and cooperation of managers from planning to implementation of facility management [30].

3.5.3. Increasing PSBUF Promotion to Surrounding Communities

Good PSBUF management can result in repeat visits. Meeting the recreational needs of visitors in urban forests is one of the things that needs attention. In addition, officers understanding of visitor satisfaction and reactions to visitor's experiences in urban forests is very important to improve recreation services. The quality of service from the officer has a direct impact on visitor satisfaction, so that the intention to make repeat visits is influenced by the impression the visitor gets. The impression obtained must match or exceed visitors' expectations [31]. A good first impression of the urban forest will be a consideration in making decisions about repeat visits in the future and recommending it to relatives. Developing the potential of urban forests will increase the chances of repeat visits, so that more visitors will come to PSBUF in their free time.

Mobile applications are used as promotional media by displaying information about a recreation area. Mobile applications reside on physical devices which are accessed via icons on the device screen [32]. Using applications makes it easier for visitors to search for general and additional information such as maps, events, and reviews [25]. Mobile applications are downloaded via Play Store or App Store so that they can be accessed by various groups of society. This application can be used as a digital tour guide at PSBUF to make it easier for users. The information displayed in the mobile application is always updated to provide the latest knowledge about urban forests. The various features presented in this mobile application can make it easier for users to find the content they need. This means that users don't need to look for content on social media or other different platforms, but just by opening the mobile application, the various content they need will be obtained easily. The mobile application can be integrated with several other urban forests through collaboration between managers to make it easier for visitors to visit urban forests in the SCR of Jakarta.

The features presented are articles, profiles, QR Code scans, maps and access, facilities, interesting objects, virtual reality, and galleries (Figure 3). The article feature presents a collection of the latest news regarding PSBUF. The profile feature provides condition information related to urban forests. QR Code (Quick Response Code) is a development of the form of a barcode. The purpose of a QR Code is to provide information quickly with a fast response. The QR Code shape is usually black geometric with a small white square [33]. The use of QR Codes is becoming better known because it has a large storage capacity, is faster, and does not require typing a URL to access a website [34]. The way to use a QR Code is by

scanning the QR Code provided using a smartphone camera and then the data will be read. Currently, QR Codes are used to identify plant types in recreational areas, one of which is urban forests. Plant identities that can be included include the type of name, plant classification, characteristics, as well as additional information such as photos of the plant.

Apart from that, there is also a feature in the form of a digital map to find the desired destination location. Location is seen based on the user's point to the desired location. Digital maps accessed on mobile applications can help visitors by displaying the best routes to the urban forest. Apart from that, digital maps can be used to make it easier for visitors to find a place. A digital map is an image of a location presented in digital form with a reduced size based on a certain scale [35]. Facilities and interesting objects at PSBUF can be a promotional tool to attract visitors to visit the urban forest.

Virtual reality became popular after the Covid-19 pandemic as a substitute product for the tourism industry. Virtual reality is a medium for promoting tourist destinations by adding to the visitor experience using technology. The technology used allows visitors to interact with the environment in cyberspace as if they were in that environment [36]. This experience is presented in visual form and displayed through the human senses according to the movements made by the user [37]. Virtual reality provides an interactive experience for visitors. The virtual reality feature provides a virtual panoramic view in 3 dimensions. The gallery feature contains a collection of photos related to articles and information on urban forests. Using mobile applications that require the internet can take advantage of the free wifi service provided by the urban forest.

Figure 3. Urban forest mobile application design

Closed Circuit Television (CCTV) provides real time information on the latest conditions of urban forests. Visitors can directly see the condition of the urban forest through the monitor screens provided so they can feel safe and comfortable when carrying out recreational activities (Figure 4). This is related to preventing crime in the urban forest because several locations are quiet from visitors. Apart from that, urban forest locations next to rivers can also be monitored to prevent accidents. Monitoring visitor activities is also important to comply with applicable regulations, such as the prohibition on littering.

Figure 4. CCTV monitor screen design

The USB Port can function to help visitors who need additional smartphone battery energy for free (Figure 5). This smart tourism-based facility can be used when accessing information in the urban forest. Nowadays, visitors need for smartphones has become important. Installation of the USB Port can be done under a shade such as a gazebo, so that users can sit and rest while waiting in between recreational activities. Collaboration between urban forest managers and the Provincial Government can be carried out to install solar-powered USB Ports. The use of renewable energy with Solar Power Plants (SPP) comes from the sun which is converted into heat energy or electrical energy. The higher the intensity of solar radiation, the greater the electrical power produced. Indonesia is a country located in the equatorial region, so it gets sufficient sunlight almost all year round. Utilizing SPP can help reduce CO_2 emissions and monitor efforts to reduce greenhouse gas emissions at the national level. The theoretical solar potential of SCR of Jakarta Province is 1499 MW [38].
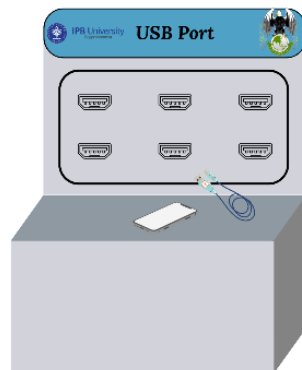

Figure 5. USB Port design

The jogging track area can be used as a route for developing smart tourism facilities. Before development is carried out, several damaged jogging track points need to be repaired for visitor comfort. Smart tourism facilities that can be placed along the route include digital interpretation boards regarding the flora and fauna of urban forests. The path to developing smart tourism facilities is used to increase knowledge and awareness of preserving nature in urban areas.

3.5.4. The Other Aspects

PSBUF does not have a Governors Decree for the SCR of Jakarta, which is a legal aspect required for managing urban forests. This condition causes land conversion potential, so regulations are needed to avoid land conversion. This prohibitive regulation is expected to prevent land conversion and maintain the environmental service functions of urban forests. Land conversion control is carried out by monitoring and evaluating the implementation of regulations.

Motorized vehicles are one of the main sources of air pollution on urban roads. The increasing number of users of fossil fuel motorized vehicles is an important factor in increasing exhaust emissions which have an impact on the environment and humans [39]. The use of environmentally friendly vehicles such as bicycles can reduce gas emissions from motorized vehicles and can reduce congestion on narrow roads.

Optimizing use of technology is very necessary. Local communities and visitors have to master information and communication technology for recreation. Managers can prepare short instructions on the website. Conveying regulations to maintain the safety of visitors and smart tourism facilities is important. This serves to avoid negative impacts on urban forests such as the loss of smart tourism facilities. Currently, the media for disseminating information are very diverse, such as social media. Technological advances make it easier to change from time to time. Apart from that, training for urban forest managers to increase knowledge and skills is also needed in developing smart tourism facilities that are optimal for use by visitors. The development of smart tourism facilities can be maximized for better urban forest management.

Installing an instruction board for using smart tourism facilities can help managers maintain the facilities. This is done to overcome the consequences of visitors ignorance of how to use smart tourism-based facilities in urban forests. Due to their ignorance, visitors who try the tools carelessly can damage the smart tourism facilities. Apart from that, another way to prevent damage is by the manager providing information at the entrance or visitor information center.

4. Conclusions

Pesanggrahan Sangga Buana Urban Forest has the potential to add smart tourism-based facilities by providing a natural ecosystem in the middle of the urban. Standard recreational facilities are available in the form of prayer rooms, toilets, gazebos, jogging tracks, parking lots, badminton courts and football fields. Urban forest management is carried out by Sangga Buana Environmental Farmers Group with supervision by the Parks and Urban Forest Service of Jakarta SCR. Sangga Buana Environmental Farmers Group strives to preserve the environment in the Jakarta SCR with facilities that do not disturb the surrounding ecosystem. The existence of jogging tracks and sports fields is still lacking. The biggest motivation for visiting the urban forest is for refreshing from daily boredom. Public facilities that are really needed are rubbish bins. Respondents need for smart tourism facilities in the form of CCTV is the highest.

Strategies that can be developed through SWOT analysis are optimizing the potential of urban forests, maximizing management collaboration, increasing PSBUF promotion, and optimizing coordination between managers. Development of smart tourism-based facilities in the PSBUF area for recreation which is recommended in the form of a mobile application integrated with various features, CCTV facilities that can be accessed by visitors, educational video screens, digital interpretation boards, and USB ports.

Author Contributions

LAR: Writing & Editing; **RH:** Conceptualization, Review & Editing**;** and **ER:** Analysis, Review.

Conflicts of interest

There are no conflicts to declare.

Acknowledgements

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