

Review

# Smart Tourism Ecosystem: A New Dimension toward Sustainable Value Co-Creation

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**Abstract:** Changes in information technology have a great influence on people's preferences and lifestyles. Smart devices and technologies have taken the conventional way of traveling into a smart tourism system. The aim of this paper is to examine smart tourism, the integration of different activities of different tourism service providers, and their interactions with tourists. It also finds out the smart tourism tools, how they are being used by different actors, how the tourist and the network perceived and interact with them for making up a smart tourism ecosystem, and finally how they create the sustainable value co-created services. This paper is qualitative in nature and used a holistic approach. The data were collected through interviews of 24 service providers and 50 service receivers, mainly tourists from the study area, Bangladesh. Study shows that there are three phases by which actors are communicating with each other comprising pre-service delivery, during-service delivery, and post-service delivery. Smart tourism tools are being used throughout the phases which eventually create value in co-created services with three pillars of sustainability (economic, socio-cultural and environmental). This study will contribute to the existing body of knowledge in the field of smart tourism, value co-creation, and sustainability.

**Keywords:** smart tourism; smart ecosystem; smart experiences; sustainability; value co-creation



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## 1. Introduction

Our society is currently dominated by the evolution of information and communication technologies. The technology basically includes information about the means, the action on it, and amendments to it [1–3]. The purpose of technological advancement is not only to improve services for increasing the quality of life but also to create a chain so that the delivery of services in an efficient manner can be ensured [4–9]. ICTs help to develop interactive services which help to interconnect local organizations as well as visitors for access to quick service delivery. Technology depicts a significant role in terms of endorsing tourist destinations, allocating and marketing tourism as well as assisting tourists before and during tourist's stay in the destination [10,11]. In the context of technological advancement, a new type of destination has emerged that helps to experience a new way of searching and enjoying the destination which is called a smart destination. It is important to provide smart destinations as well as opportunities for the co-creation of emotions so that tourists can experience unforgettable visits. Today's tourists desire to be astonished by

knowing the mysterious things of the destination and want to be informed about what to do, what to visit and how to catch a place by using smart tools [4]. In the context of smart tourism or smart destination, it is clear that technology assimilates global involvement into the comprehensive destination. In this approach, tourists vigorously participate with service benefactors and cooperate in co-creating tourists' own involvements as well as a sharing experience, which directly leads to innovation [12–15]. Due to the advancement of technology especially social media advancement; emphasis on value co-creation is also increased. Social media and augmented and virtual reality have changed the dimension of tourism as nowadays people are experiencing their surroundings and putting a mark on the service creation process. Furthermore, nowadays, sustainability in terms of economic, environmental, and sociocultural, in the technology-denominated service has become crucial [16], particularly in the tourism industry [17]. There is ample significance of sustainability in the value co-creation process [18] but still, very little literature is found on the uses of smart technologies and value co-creation. This paper aims to provide a holistic view of a value co-creation ecosystem by examining the opportunities of implementing applications of smart tourism tools from the perspective of the service provider and service receiver. So, the current paper can be considered as a theoretical framework for smart tourism and smart tourism tools for value co-creation and technology integration. However, most of the research showed smart tourism, smart tourism ecosystem, and actors. This study aims to find the amalgamation of smart tourism, tools, actors, and ecosystem, and how the ecosystem contributes to sustainable value co-creation.

## 2. Literature Review

### 2.1. Smartness and Smart Tourism

Smart has turned into the popular expression to portray innovative, economic and social advancements driven by innovations that depend on sensors, enormous information, big data, approaches of the network, and interconnection among the technological advancement that is the Internet of Things, RFID and NFC [6,19]. It is a complex amalgamation of all the technological tools-soft smartness and hard smartness-which bridges the digital and physical elements. Harisson et al. [20] refer to the smart as exploiting operational, near real-time real-world data, integrating and sharing data and using complex analytics, modeling, optimization, and visualization to make better operational decisions.

Smart Experience focuses on technology-mediated tourism experiences and their enhancement through personalization, context awareness, and real-time monitoring [3,5]. For the sustainable tourism experience, a smart tourism ecosystem is created so that personalized, context awareness, as well as real-time monitoring, can be ensured. According to Neuhofer et al. [21], major drivers of the smart tourism experience are information accumulation, ubiquitous connectedness and real time synchronization. Smart tourism experience not only facilitates actual destination place by sharing real time contents but also supports pre as well as post trip phases which helps to share better experiences than before [18].

Technology appears as a propelling and important force for smart tourism. For this purpose, the tourism industry is known as the substance of high-tech renovation that allows easier and quicker ways of performing business, encouraging competition as well as globalization [16]. The development of the tourism sector is related to other organizations promoted by the use of the internet. Day by day an incredible number is noticed in terms of online booking for tourism-related products due to the embracement of technology. Technology facilitates better affiliation between service providers or tourist associations, destinations, and consumers. Factors such as technological development, innovative activities, digital spaces, information processing, smart tools, and ICT infrastructure, such as cloud computing and the Internet of Things, are basically responsible for the creation of smart tourism ecosystem [22].

In smart tourism, technology is seen as an infrastructure, rather than as individual information systems, and encompasses a variety of smart computing technologies that

integrate hardware, software, and network technologies to provide real-time awareness of the real world and advanced analytics to help people to make more intelligent decisions about alternatives, as well as actions that will optimize business processes and business performances [23].

### 2.2. Smart Tourism and Smart Tourism Ecosystem

The Smart Tourism experience is very efficient and rich in meaning where tourists are active participants in its creation and participation. Besides their consumption, they create, annotate and enhance the information that constitute the basis of their experience through the posting of their photos, story with destination hashtag. Neuhofer et al. [24] found that information aggregation ubiquitous connectedness and real time synchronization played as a major driver of smart tourism experiences.

Smart ecosystem has been described as the relationships among the micro and macro level stakeholders for producing tourism experiences through human organizations, technology, shared information and services and resources exchange on the basis of pre delivery, delivery and post-delivery experiences. Murphy et al. [25] pointed out that the smart tourism systems are intended to be dynamic networks. Formation of smart ecosystem requires smart technology groundwork. With the help of personal technological touch tourists can easily as well as actively contribute data by their activities, engagement, queries and contents and these indicates most significant elements along with government, media and residents in terms of building smart ecosystem. According to Gretzel et al. [6], smart tourism ecosystem is a platform of creating managing and delivering touristic services via technological advancement which leads to information sharing and value creation. The prime elements of ecosystem are service provider and receiver, support services, technologies, platform, NGOs, companies from other industry. The resource also classified among actors, based on tangibility/intangibility (tools, software, infrastructure), human resources (skill, knowledge and commitment) and the relational resources (network among the resources) [6].

### 2.3. Smart Tourism and Sustainable Value Co-Creation

Today, travelers are capable of using smartphones during travel for communication, social happenings, information attainment, information search, and amusement [2,11]. Smartphones play an important role in terms of shaping tourists' experiences during vacations. Tourists participate actively in terms of experience creation-uploading photos to Instagram and Facebook with destination-related hashtags helps others to know about unknown destinations [26]. This is the process by which potential tourists can be found and with the help of promotional activities in order to encourage mobile applications, potential tourists turn into actual tourists.

Value co-creation idea basically comes from the notion that consumers can play a dominant factor in terms of the modernization process of new services and products in order to make sure that value must be added from the consumer's point of view. According to Nitsenko et al. [27] and Zine et al. [28] co-creation model is basically comprised of a provider sphere, customer sphere, and joint sphere. Value co-creation can only be possible when direct interaction would happen between the provider and the customer [28]. Co-creation is the mechanism by which customers' skills are accumulated into the company's value creation. Customer knowledge is considered a supplementary idea resource to the company's internal value-creating procedure and thus it supports the company's value creation [26].

Consumer–company interaction has become the locus of value creation [24]. The scope of these value-creating interactions has extended beyond the consumer and the company, even though the value is co-created through the combined efforts of firms, employees, customers, stockholders, government agencies, and other entities related to a given exchange, it is always determined by the beneficiary (e.g., customers). Businesses in fact should “create an experiential environment in which customers can have an active

dialogue and co-construct personalized experiences” [24]. Concerning technology, ICT plays an active role, while creating value co-creation from three perspectives: pre-delivery (from getting information to online booking), serving delivery (different applications and applications for taking instant information and services); post-delivery (social networks or sites to express the review with a hashtag of the destination) [22]. Day by day, consumers depend on smart tools for tourism purposes which is increased due to the attitude and intention of consumers concerning the use of technology [11]. Customers are very inclined with the intention to use technologies that are smart and adaptive [9]. The motivation for using smart tourism tools is not only limited to practical values, such as ease of use, but also hedonic values, such as enjoyment and pleasure. Kim and Law [29] stated that enjoyment is considered the psychological motivation for tourists to buy services through technology.

Traditionally, firms or service provider was responsible for the value-creation process but with the passage of time new dimension has arrived due to technological advancement, where both service provider and customers equally play the role in the creation of value [10]. The customer’s value creation process is linked with the involvement with the enclosure of the client’s skills as well as knowledge [7].

Sustainable co-creation refers to a wide range of alternative approaches that are more advantageous economically, socially, and environmentally involving customers [17]. The methods of resource integration that have been identified have benefits for (1) environmental; (2) social well-being (by fortifying ties with system actors); and (3) an economic advantage (innovation because they improve their service [22]. Technology “greatly alters organizations’ views and behaviors towards environmental sustainability” [30]. By emphasizing the significance of investigating both the technological and social spheres as drivers for customer orientation to the social environment (institutions) in which ecosystems lie. The appeal for the adoption of a systemic perspective on value co-creation, however, has not yet been fulfilled [30].

### 3. Materials and Methods

A qualitative approach was chosen in consideration of its holistic nature. The current state of smart tourism tools is analyzed through desk research, by examining the depth phenomenon. Then, the semi-structured interview method was used in this study to collect data, making it feasible to precisely direct the interview process in addition to interacting and sharing ideas. The community of service providers and receivers was identified for the interviews. Five distinct groups were taken into account in this research as the statistical population, which in this study consisted of several groups engaged in value co-creation. The first and second groups consisting Travel agents and tour operators, and hotels and resorts, respectively, providing the service using smart tourism tools to the tourist. These groups included value co-creation in the sustainability goals of their business. The third group is comprised of the service receivers mainly tourists and guests, who looking for ease of experience while contributing to sustainable value creation. The fourth (a) groups encompass the government and international organization which creates the atmosphere and acts as catalysts. The fourth (b) group consists of an international organization working across borders to understand the more general overview. The theoretical saturation rule, however, was used to determine the appropriateness of sampling in this study, therefore sampling proceeded until no new pertinent data on the topic were received. A total of 24 service providers (a combination of tour operators and travel agents, hotels), 50 service receivers mainly tourists, 1 government organization, and 2 international organizations were interviewed. Before the interview, they were sent the questionnaire through the mail, and then the interview was conducted. After collection, thematic qualitative analysis methods were adopted. Firstly, the data were labeled with important data patterns. Then, all the data were coded by segment and sub-segments. Finally, based on this, the results were formulated.

## 4. Results

### 4.1. Service Provider: Tour Operator

The tour operators and the hotel have both informal and formal relationships among themselves but mostly formal relationships. They have to communicate with potential tourists through different tools. The most tour operator provides their information on their websites and they have a direct messaging system on their websites by which potential guests can communicate with them. They have links to social media platforms, such as Facebook and Twitter, on their websites, allowing potential tourists to access those platforms directly. They updated all information and displayed their benefits as well as other essential details on the social media pages. Additionally, websites have pop-up messages to greet potential visitors.

Some tour operators have their own mobile applications, particularly Android applications that can be found in the Google Play store. Potential tourists can download the applications on their smartphones, which feature a direct mailing system and all the information the tour operator provides. Most of the tour operators are using different mobile applications, such as IMO, Line, Facebook Messenger, Viber, WhatsApp, WeChat, and Skype, to communicate with the potential service receiver. With these smart tools, they instantly contact them and if necessary, using a video call service. In addition, some of them use different mobile applications based on geographical location- they mostly use WeChat for the Chinese market, Line for Japan and Thai Market, WhatsApp for Indian, Russian, and South American markets, IMO and Viber for the Middle East, some Asian countries and European Countries. Facebook Messenger is widely used throughout the world, especially in Australia and North American countries except in some countries around the world. Some tour operators provide virtual tours and 360 panorama pictures and videos of different tourist places through their websites. Some outbound tour Operators show different places of their targeted destination where they are arranging tours and they also use virtual reality devices to show different places to the local people who are expecting to go for an international tour. During the time of the tour, the tourist is given some augmented reality applications which are very limited. Few operators use the electronic interpreter to understand tourists clearly who are non-English speakers [31–36].

In this stage, for resources integration, they were asked—with whom they are contacting, whether they have formal or informal relationships and how smartly they communicate among themselves. The majority of the tourists replied that they have a very strong formal relationship with government organization and international organization and both formal and informal relationship with hospitality industry, transportation sectors, local organizations and host communities.

The government tourism organizations, such as the Bangladesh Tourism board, provides tour operators with information materials, such as electronic maps of Bangladesh and different destinations delineating all the necessary information, electronic brochures of different destinations describing brief . . . of the attractions and the services to avail and electronic books, which includes all the details of the destinations. They also provide information related to outbound tourism through websites and email. Most of the tour operator said that the government organization are trying to provide all the necessary services in a traditional way. They are very reluctant to use smart devices for communications; they have only website and email services by which they are providing necessary information [37].

Regarding international organizations, the tour operator is exchanging information through various smart devices. Some of the tour operators said that they are mostly communicating with world-renowned organizations such as Pacific Asia Travel Associations (PATA), and International Air transport Associations (IATA) through email, and very often they use Skype for live conversations. The minority of them are communicating through Facebook messenger, WeChat, and other mobile applications [38].

For arranging accommodations, food and beverage, and transportation, they have both formal and informal relationships with hotels, restaurants, and transportation companies.

In the case of hotels and restaurants, majority of the tour operators' books rooms through booking software such as NICE, INN Board and other GDS software which are used by different hotel. They are getting software generated discount from their enlisted hotels. They also exchange information through different smart mobile applications, such as Facebook messenger, IMO and WhatsApp, which are popular in Bangladesh. Some of the tour operators uses the virtual 360 pictures and videos of hotel rooms and services which is generated and provided by the hotels and restaurants.

Regarding the transportations, most of the tour operator are member of IATA and have a good relation with other airlines. They get all the information through their websites about all the updates. Most of the tour operator use Global Distribution System (GDS) for reserving Air tickets such as Amadeus and Galileo. For local transportations, most of the tour operator have their own vehicles but in case of high demand they have to contact with local transport provider. Some tour operators use Uber, Pathao services for transporting their guests to very close destinations. Most importantly, almost all of the tour operators said that they are somehow dependent on Google Maps.

They were asked whether they are using smart tools for communicating and exchanging information and resources with local organizations and host communities. Most of the tour operators replied that they are using very few smart devices for communicating but only mobile phone communications especially in very remote areas.

In terms of sustainability, while co-creating service, the travel agents and tour operators coined the uses of smart tourism tools to plummet the use of paper and pencil, reducing the time as they can communicate with potential and existing tourists and with their employees promptly. The tour operator can access the required information about destinations, different facilities provided by the government and concerned authorities, and insights about upcoming events, rules, and regulations [39]. The following is a quote by a participant-

"We mostly employ interactive applications to engage with our current and future tourists, which eliminates the majority of our paper-based work and increases our efficiency by shortening the turnaround time. Our business organization can provide us with immediate information regarding destinations and governmental facilities" (Participant 5).

Some of the tour operators expressed they can reduce marketing costs using social media communications. Few others coined that they can reduce environmental damage by getting instant advice from trade bodies, environmental organizations, and the government.

"We get instant information about a destination's probable hazard, any upcoming environmental catastrophe, and any action taken by the government by using smart devices. And we can also disseminate the information to our tourists" (Participant 3).

#### Service Provider: Hotels

The collaborations and resources exchange of hotels with other actors such as tour operators, transportation companies, government and local authorities, local and international organizations and the host communities as other service providers and the tourist as the service receiver are performed through different smart tourism tools [40–44]. Regarding guests and potential guests, they were asked what are the smart tools tour operator are using to attract the potential tourist and how they are serving them in a smart way. All of them replied that they are providing their information through websites and they have direct messaging system in their websites by which potential guests can communicate with them. Direct booking systems are available in their websites and the relevant information regarding the room types and the fair and others facilities. Most of the hotels have a virtual tour of the hotel facilities in their websites where potential guest can visualize the hotels standard and the services. A hyperlink of social media, such as Facebook and Twitter are also available in their websites through which the potential tourist can directly go their

social media pages. In the social media pages, they updated all information and activities and the positive reviews about their property. Pop up message of social media to welcome the guest are enhance the guest communications.

During the service, all hotels provide their guests with a simple, automated process of IoT devices containing thousands of devices and sensors from rooms to public areas. Most of the hotels are using smart thermostat sensors, which can monitor and respond to fluctuations in occupancy. Some of the hotels have their own applications for providing smart services which are given to them at check in time. Smart occupancy notifications are given to the hotel front office and the guest can order anything and can call the room attendants any time through this smart applications. Guest can also take personalized services by providing notifications through hotel generated applications. Most of the hotel have smart plastic key cards and some hotels offers guest room access via smartphone applications. Only a few five-star hotels have mobile applications for checking into the hotel. In the rooms, some of the hotels have smart electronic system where all the electronic appliances work with sensor from water supply to smart TV. Some hotels have the smart parking system through sensor applications for reserving parking spots. At the end of the guest's stay, travelers can self-checkout through the smart applications and transfer money through cards. All of the properties are managing PMS (property management system) software for managing all the resources, staff, and points of sales. International chain properties are using Opera and the local properties using NICE and Inn board PMS software.

Regarding the resources and information sharing with the tour operators, the hotel property connected with them through the email and web-generated messaging system. Some of the hotels allow enlisted tour operators to book directly and get software-generated discounts.

However, hotels are communicating with government organizations through traditional ways. They only use email communications and sometimes talk directly over the phone. Some of the hotel's executives said that government organizations are very reluctant to convey smart devices to carry the resources exchange and information.

Most hotel and resort executives opine that smart device helps them to maintain sustainability measurements while co-creating value with tourist, and tour operators. It helps the property to maintain smoothly as they can track equipment, machinery, people, and even guests. Smart devices help to reduce energy consumption while providing service to the guests. Some executives said that the ai based smart devices plummet unnecessary and overlapping tasks and help the front office to smooth operations.

“We use artificial intelligence (AI) powered smart devices on our site to minimize task overlap. It can also assist us in keeping track of our everyday needs. Most crucially, AI-based technology enables quick check-in and check-out for guests without having to keep them waiting in line at the front desk” (Participants 12).

#### *4.2. Service Receiver: Potential and Actual Tourist*

In the value co-creation process the consumers have a distinct role with service providers by using smart tourism tools. They were what sort of smart tourism tools they usually for their travel, how they use them, how they communicate with tourism service provider, and how they express their tour experiences. Most of the tourists replied that they tend to adopt smart technologies if they find them useful, easy to use, as well as compatible in performing activities, such as searching information regarding travelling, making hotel reservations, purchasing travel related services, enhancement regarding experience the destination. With the help of smart tourism tools, consumers want to save time, be more effective and efficient. Some tourists like to watch virtual tours before making decisions to travel and reading tourism blogs and articles related to the destinations. Most of the tourist like to read Trip advisor, Off Road Bangladesh, travel blogs, the travelers reviews and some other travel news for collecting information relating to the destinations safety security, attractiveness, food and accommodations. They also watch YouTube videos on the targeted destinations before going there. They also go through the social media

reviews and ratings for selecting destinations, hotels and other services. For going to restaurants, they go through the food blogs and the scores.

In the case of acquiring transportation, they were asked how they manage transportation for travelling. For making outbound tours, most of the tourist purchase ticket from travel agent and they communicate with travel agent directly. Some of the tourist purchase air tickets online through direct airline websites. Very few tourists purchase air ticket internet-based booking websites such as Expedia, booking bd.com and others. For local transport some traveler uses smartphone applications such as Shohoz for reserving bus tickets and some use online government platforms for rail tickets. For short distance especially in the city area they also depend on smart technologies—with the help of mobile applications such as Uber, Pathao, and Shohoz, it is easier to find out convenient transportation with convenience price. Transport related applications helps to reduce bargain hassle and gives pleasure and time saving riding. Travelers have to select destinations on the map and then the drivers nearest to travel will show up on the map. To most of the travelers, Uber, Patho is known as the balance of availability, cost and convenience.

During the post-tour, most tourist post their photos and status regarding the tour experiences on social media, such as Facebook, and Instagram. They write travel blogs on different online platforms like Trip Advisor and Off Road Bangladesh. They also like to write in different travel Magazines such as Vroman, the tourism, and Parjaton Bichtra.

Most tourists talked positively about sustainable value co-creation through the smart tourism ecosystem. They found it most convenient to communicate with service providers at any time. They even chat with chatbots to get important information, which reduces the time and hassle to visit the travel agent or tour operator to get the service and information (some coined that time is money). They also get valuable information about the host community, culture, and ideas, which helps them to keep the socio-cultural sustainability. Few tourists said that they received an emergency update about a sea catastrophe.

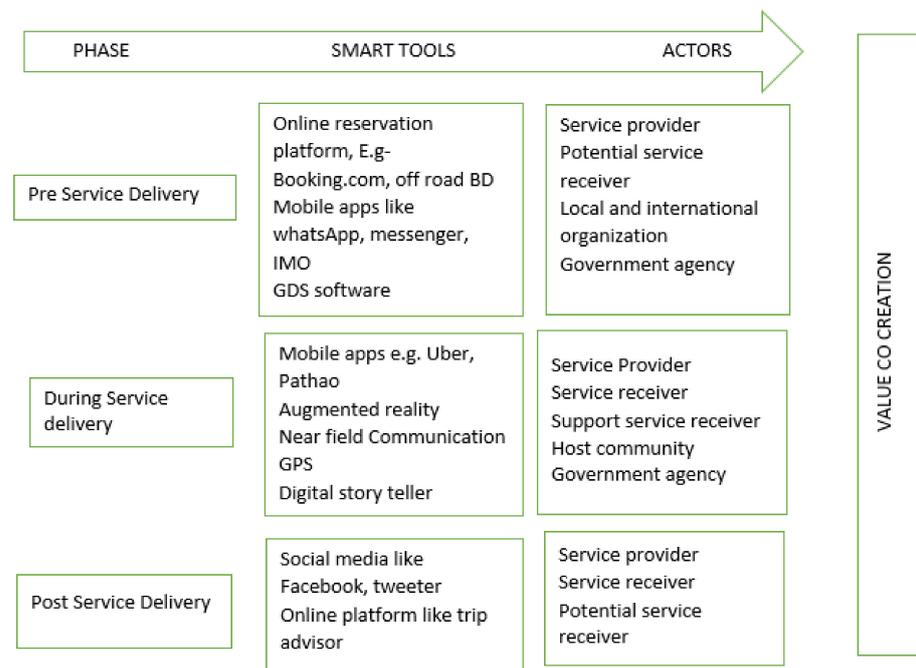
“ ... I purchased a package from a tour operator without visiting their office which helped me to concentrate on my regular work. Even I contacted them at night while watching a tv serial. It saved a lot of time. You know time is money” (Participant 18).

“ ... before visiting the destination, I got information about the host culture, from the travel agent over WhatsApp. I also message destinations authority about events, I received information instantly” (Participant 31).

## 5. Discussion

The service provider interacts with the service receiver and other elements of the smart ecosystem through smart tools, which eventually create the value of co-created services. From the results, a holistic process can be found in three different phases (Figure 1). In each phase the users communicate with each other through smart tourism tools and make a smart ecosystem.

In pre-service delivery, smart tools, such as mobile applications, can predominately provide information, such as making reservations, choosing local amenities, available packages, and ancillary services within hotels, and restaurants, finding directions, choosing transportation, and finding out cultural heritages and its spectacular parts. Smart tourism tools help to offer convenience with the help of user-friendly interfaces and providing up to date information within their affordability. With the help of global distribution and a central reservation system, web-based technologies led to the flourishing of smart tourism. Mobile applications also create high mobility in terms of tourism information and tourism consumers as well. In this stage, public-private collaboration is noticed which helps the government to become more and more technology-focused which helps integration and intelligent use of data. Service providers anticipate users' needs based on various factors and make recommendations for context-specific consumption activities, such as points of interest exploration opportunities.



**Figure 1.** Value co-creation through smart tools and Smart tourism ecosystem.

During the service delivery, mobile applications also help in terms of the service delivery stage by providing audio guidance. Augmented reality helps a lot in terms of service delivery as AR provides opportunities for experiencing virtual reality. In case of a visit to the cultural heritage, AR helps to guide and offer a point of interest. Google glass and HOLO lens by Microsoft are considered convenient and wearable smart AR tools which help to create unique experiences for tourists while visiting cultural heritages. Smart tourism tool NFC can be used for scanning information and translating it into their own language or native language and this will help tourists to better understand. Navigation not only helps to find locations but also helps to explore unexplored destinations. With the help of IoT Service providers help to augment travelers' on-site experiences by offering rich information, location-based and customized services with the help of a navigation system, and interactive services with the help of AR.

In post-service delivery, basically, smart tourism demands technology-mediated tourism experiences and their enrichment with the help of personalization, context-responsiveness, and real-time monitoring. With the help of a technology-embedded environment, tourists can experience the destination which helps to increase the destination's competitiveness. Tourists participate actively in terms of experience creation such as by uploading photos to Instagram and Facebook with destination-related hashtags helps others to know about unknown destinations. Service providers enable travelers to share information so that other travelers can be benefited in the decision-making process and this also leads revive and reinforcing travel experiences and constructing self-image on social networking sites. In addition, service providers obtain both positive and negative insights about the tourist experiences with them which provides them about their strengths and weaknesses. Through smart devices, service providers can communicate, instantly, with their guests about their bad experiences (if any) and commit to refurbishing the next experience. Additionally, in case of positive exposure, they can promote the notion and utilize in their next marketing campaign.

Furthermore, in the value co-creation process, every actor (stakeholder) uses smart tourism devices, while communicating with each other in three phases which creates an ecosystem. In this ecosystem, all the actors get instant access to the information and necessary to-does, which creates a multistakeholder smooth and smart working environment where everybody is the contributor.

Sustainable co-creation refers to a wide range of alternative approaches that are more advantageous economically, socially, and environmentally involving customers [17]. However, in this study author has found that the service providers (both travel agents, tour operators, and hotels and resorts), service receivers(tourists), and local and international bodies benefited themselves, each other, and the community economically, socio-culturally, and environmentally (Figure 2). The travel agent and the tour operators and hotels and resorts are fostered by plummeting paper-based work, saving time, and maintaining long-term relationships with the forward linkage actors. They also decrease overlapping tasks which eventually lower their costs, increase efficiency, and help to foster economies of scale.

<i>Actors</i>	<b>Smart Tourism Tools</b>	<b>Economic Sustainability</b>	<b>Socio-cultural Sustainability</b>	<b>Environmental sustainability</b>
<i>Tour Operator &amp; Travel agents</i>	Online reservations Apps; Social Media apps; communications apps; Interactive Websites; GDS software; Organizational customize apps	Plummet pen & paper; time-saving (Time is money); decrease unnecessary and overlapping tasks; lessen marketing cost (easy & long-term communication by apps); Economies of scale; Increase energy efficiency;	Instant access to the information; Long-lasting relationships; instant access to the government & public facilities	Reducing energy consumption; proper guidance & indication of environmental challenges
<i>Hotels &amp; Resorts</i>	Online reservations Apps; Social Media apps; communications apps; Interactive Websites; GDS software; Organizational customize apps	Plummet pen & paper; time-saving (Time is money); decrease unnecessary and overlapping tasks; lessen marketing cost (easy & long-term communication by apps); Economies of scale; Increase energy efficiency;	Instant access to the information; Long-lasting relationships; instant access to the government & public facilities	Reducing energy consumption; proper guidance& indication of environmental challenges
<i>Tourist/ Guest</i>	Online reservations Apps; Social Media apps; communications apps;	Reducing traveling costs; Time saving from visiting different agents;	Ease of social& cultural exchange; Instant access to the information; positive behavioral change; instant access to the government & public facilities	Reducing energy consumption; proper guidance& indication of environmental challenges to the service receivers; receiving information about destination ecology ahead of the tour, ecosystem, & Conservation
<i>Government &amp; International Organizations</i>	Government/organization customize apps; interactive websites; social & communications media	Plummet pen & paper; easy dispersion of information; time-saving;	Instant access to the information; Provides facilities effortlessly;	Providing information about destination ecology ahead of the tour, ecosystem, & Conservation

**Figure 2.** Sustainability among the value co-creation actors (author compilation).

As active actors of the ecosystem, tourists contribute to sustainable value co-creation. They are benefited by reducing traveling cost to the backward linkage agents before the travel start and can gain prompt access to the pull of information. They also contribute to sustainable socio-cultural activities by understanding the community culture, ideas, norms, and necessary particulars where and whenever they need. They are also smart tourism ecosystem active members while contributing the environmental sustainability in the value co-creation process. Government and international bodies play actively in the ecosystem while maintaining sustainability.

Finally, we have found that there is a strong relationship between a smart tourism ecosystem and sustainable value-creation (Figure 3).

The service providers (both travel agents, tour operators, and hotels and resorts), service receivers(tourists), and local and international bodies benefited themselves, each other, and the community economically, socio-culturally, and environmentally by forming a sustainable value co-creation.

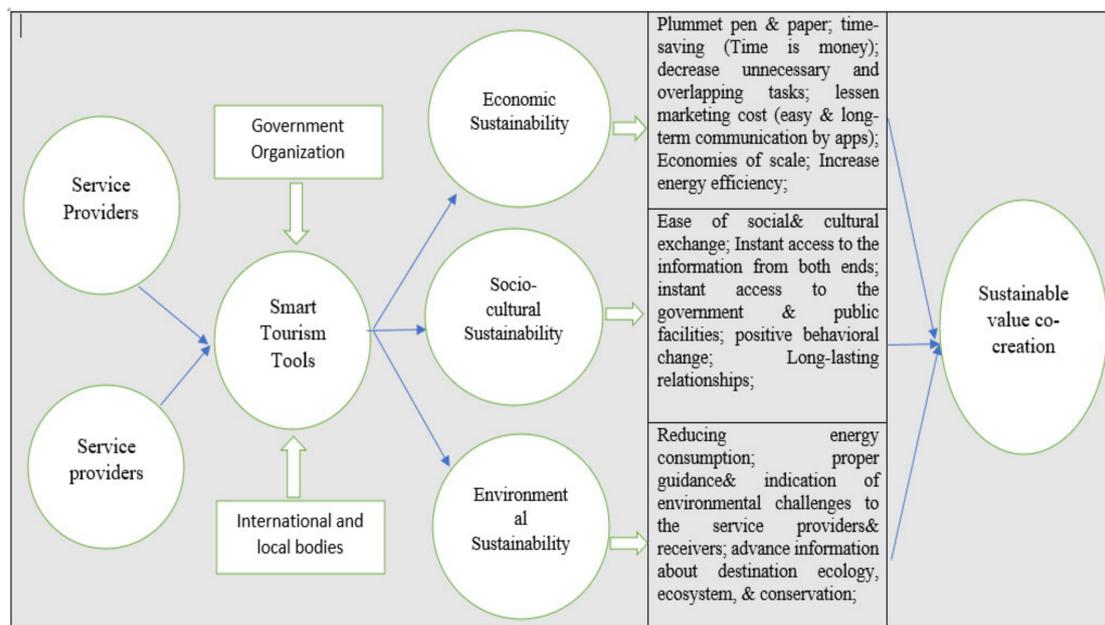


Figure 3. Sustainable Value co-creation (author compilation).

## 6. Conclusions

This paper attempted to provide an overview of smart tourism, smart tourism tools, and the smart tourism ecosystem and how all of this encompasses sustainable value-created services. It identified three phases where different actors work together and communicate with each other using different smart tools, such as augmented reality, Near Field Communication, mobile applications, and digital devices. However, the coordination and the sharing of information through the actors for sustainable value co-creation are still in their infancy. Therefore, smart tourism initiative around the world is seeking to construct a smart tourism ecosystem [6]. Thus, this paper somehow enhances value creation through smart tourism tools and a smart ecosystem in a sustainable way.

While the past studies have contributed to the foundation of smart tourism concepts and different smart tourism tools used for the connectivity of different tourism stakeholders, our findings contributed to the holistic approach of value co-creation through smart tourism and smart tourism ecosystems created through different actors. It provides some theoretical contributions to the existing literature in several ways.

First, this study clarifies the smart tourism ecosystem by identifying the smart tourism tools used by the different service providers, service receivers, and other stakeholders in the tourism industry. The initiatives of Smart tourism around the world are searching to build feasible smart tourism ecosystems [6] but the complexity of the systems create this very difficult to go beyond very specific platforms-, technology- or service-specific innovations [6]. Thus, these findings create an ecosystem of smart tourism with different actors from the service provider and service receiver end in three different phases with very specific smart tourism tools. Second, most literature focuses extensively on the e-tourism comprising websites and social media [27]; this study offers insights into the dominant tools of the smart tourism ecosystem: augmented reality, virtual reality, and different applications facilitate the sustainable co-creation of value in the tourism industry. Thus, it is the pioneering work that investigates service providers' and service receiver intention to develop co-creatively developed smart services using different smart devices and shows that uses of smart devices are used in different phases by the same persons. Finally, this piece of work proposes an effective ecosystem framework for academics and practitioners that can be used for further study to understand the smart ecosystem in the different service industries.

In addition to the theoretical contribution, this paper provides a number of actionable solutions for tourism executives with smart tourism, smart tourism ecosystem, and value co-creation.

First, the tourism executives especially the tour operators and hotels may focus on its innovative service receivers using different smart tourism tools, such as Augmented reality (AR) and Virtual Reality (VR), Near Field Communication (NFC) devices different Mobile applications, and devices and persuade them to get involved actively in smart co-created tourism services. Second, according to the conceptualization of the study, hotel and tour managers can better utilize mobile technologies, smartphone applications, and other smart technologies to facilitate co-creative service innovation through increased interactions between customers, and service staff, and further can take the help of innovative tools Facebook, Amazon, YouTube [23]. Third, the service provider and different actors and the other engagement platforms of the smart tourism ecosystem could help decisions maker to take extensive decisions for utilizing the maximum output in case of resource sharing. Based on this, decision-makers should be encouraged to maintain a sustainable relationship and to extend the knowledge to be exchanged through the actor's participation and the interactions through the optimal use of smart tourism devices. Finally, it focuses on smart tourism, and ICT, which government should focus on as there are very few investments in tourism in Bangladesh [12] to uplift the tourism industry.

## 7. Limitation and Directions for the Future Work

This work includes some limitations and the main one is in the methodology. This took only the interview from the tour operator, the hotels and the tourist, while it can also take interview from other actors, such as government organizations, host communities, local and international agency and all other stakeholders working as actors to make more comparisons and the acceptance of different technologies. So, further research can be conducted with others stakeholders working as actors. The number of executives of different tour operators and hotels interviewed can also be increased for the validity of the data; future research can be conducted with a larger sample size. The observation method can also be employed to understand and analyze the content (sharing of social networks and reviews from online sites) in order to execute more in-depth data analysis and gain more insights. So, both case study and observation method for data collection can be applied for further research for understanding more on the topic. In addition, to generalize the finding of the study its insights to Bangladesh's hotel and tour operators, other industries and other contexts can be taken into consideration for future work. However, the extensive future research can be carried out on other issues on privacy concerns of data transfer through smart tourism tools, the challenges of value co-creation through smart technologies, tourist satisfaction while co-creating smart tourism services, and variations of smart tourism tools used different level of hotels (star ranking hotels and B&B hotel) and tour operators (domestic and international tour operator).

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