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Homogenizing Design Thinking Process with Avitourism: Solving Industry Problems using Traditional Knowledge System

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Abstract: Avitourism has grown exponentially since the 1980s due to technological advancements. However, local communities living near abundant and diverse bird habitats face micro-level challenges in capitalising on available resources to their benefit. This study illustrates the case of Dosdewa, an emerging avitourism destination in India. The Khasi community living in Dosdewa used the design thinking process (DTP) to overcome the challenges of establishing Dosdewa as a sustainable avitourism destination. DTP is a multi-stage, human-centric approach to solving wicked problems through innovation. The innovation of a purposefully revised version of *Suh Sim Um*, a traditional sublime bird hunting technique of the Khasi community, helped avitourists observe 40 species of birds in a dipterocarp habitat. This technique is non-obstructive, non-intrusive, and non-consumptive. This technique requires minimal apparatus for birdwatching, reduces disturbance to birds, limits damage to bird habitats, reduces birdwatcher fatigue, strengthens community conservation values, benefits local communities financially, and facilitates the conservation of intangible cultural heritage. This study provides theoretical and practical implications for academia and tourism practitioners, respectively.

Keywords: Artificial bird calls, avitourism, bird hides, design thinking process, Khasis, traditional knowledge systems

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Introduction

Tourism creates employment opportunities, encourages exports, and steers economic development and growth. Many developing economies have recognised tourism as a driver of economic growth (Roxas et al., 2018; Salee et al., 2022). It involves multiple internal and external stakeholders that work together to deliver end-user experiences to tourists. These stakeholders have different agendas, objectives, and interests (Bramwell & Lane, 2000; Timur & Getz, 2009). The multitude of varying interests of stakeholders enables opportunities for social innovation at multiple levels (Mahato et al., 2021). However, tourism development usually takes a capitalist approach, reducing benefits for local communities (Dredge, 2017; Gurung et al., 2022; Mahato et al., 2021).

Sustainability has received a growing interest from tourism stakeholders since 1987 (Roxas et al., 2018). With reference to the World Tourism Organization (WTO), sustainable tourism has been defined as an endeavour that enhances the well-being of the local inhabitants, improves the overall tourist experience, and safeguards the environment, which is vital for the sustenance of both tourism and the local community (McIntyre, 1993; Wickens et al., 2015; Yu et al., 2009). Social innovations at tourist destinations can help local communities achieve sustainability by reducing the externalities of commercial production (Florin & Schmidt, 2011; Mahato et al., 2021; Shaw & Carter, 2007). However, the existing body of literature has been deficient in explaining the strategies adopted by local tourism social entrepreneurs to overcome obstacles to the mobilisation and capitalisation of available resources (Altinay et al., 2016; Mahato et al., 2021). Lack of research on the intangible knowledge of communities regarding their environments (e.g., ethnobotanical knowledge, biodiversity knowledge, etc.) and its role in tourism is evident (Katelieva et al., 2020). Attaching a socio-economic value to this knowledge through social innovation in tourism is crucial, as it shapes landscapes, constructs the identities and images of destinations, and allows locals to interact with tourists seeking local culture and nature interpretation (Katelieva et al., 2020).

Recently, design thinking (DT), an approach to social innovation that prioritises consumer demand, has gained increasing recognition in various sectors, including tourism. It places the needs and experiences of end-users at the forefront of problem-solving, emphasising empathy, ideation, and iterative prototyping. This study uses the IDEO 3I design thinking (DT) model to establish Dosdewa, a remote village in India, as an emerging avitourism destination. The primary objectives of this study are:

Objective 1: To identify opportunities and challenges for developing Dosdewa into an avitourism destination.

Objective 2: To develop innovative, sustainable solutions to address challenges in avitourism operations in Dosdewa.

This study utilises the indigenous knowledge system of the local community to address the obstacles to destination development.

Literature Review

Avitourism

Avitourism is recognised as one of the fastest-growing subsectors and the largest constituent of the eco-tourism industry (Callaghan et al., 2017; Czeszczewik et al., 2019; Sekercioglu, 2002; Vas, 2017). Avitourism refers to travel undertaken by an individual to a tourist destination for at least a one-night stay, with one of the components of the travel for one or more purposes of observation, education, and photography of birds in their natural habitat (Biggs et al., 2011; Department of Trade and Industry, Republic of South Africa, 2010; Nicolaides, 2013; Sekercioglu, 2002; Steven et al., 2014; Vas, 2017). The use of the term avitourism is new (Steven et al., 2014). As a composite term with tourist as its cohort, not all birdwatchers may be termed avitourists in cases where their activities are strictly limited within a geographic area that does not require an overnight stay.

Avitourists are a heterogeneous group of people with different motivations, attitudes, and behaviours (Chen & Chen, 2015; Hvenegaard, 2002). Existing studies have highlighted that they are generally well-educated, middle or old-age tourists, relatively affluent, have more disposable time, and are sensitive to nature conservation (Chen & Chen, 2015; Sekercioglu, 2002; United States Fish and Wildlife Service, 2019). However, the existing research on avitourism primarily concentrates on traditional birdwatching regions like North America, the British Isles, Australasia, and Scandinavia (Connell, 2009). Avitourism has grown exponentially since the 1980s beyond its traditional geographies (Sekercioglu, 2002) due to advancements in technology, for example, optical aids used for birdwatching, aeroplanes, rare bird alert pagers, and the internet (Moss, 2004). Chen and Chen (2015) found that Asia is the second most frequently visited international avitourism destination after North America and Central America. Nevertheless, there is a noticeable dearth of research on avitourism in Asian countries such as India and China, despite their abundant bird populations (Steven et al., 2017).

Birdwatching activity predominantly occurs in peri-urban areas (Connell, 2009). Numerous varieties of avian species reside in or near urban areas, which makes them easily observable. In contrast, rare and unusual birds, especially those that migrate, often prefer rural and secluded areas. These locations, which may evoke a sense of discomfort among general tourists, have been documented for attracting birdwatchers (Weidensaul, 2008). Local communities living near such abundant bird habitats have an opportunity to earn income from avitourism.

Unfortunately, bird and habitat conservation is a dismal subject. As per the Global Living Planet Index, 68% of the global bird population has declined between 1970 and 2016 (Almond et al., 2020). Osuri et al. (2020) identified hunting, forest conversion, and forest degradation as the main reasons for the defaunation of bird species. Local communities fail to realise the non-consumptive commercial and conservation value of birds. Avitourism can help in the realisation of the non-consumptive commercial and conservation value of birds, as it creates opportunities for economic exchange in the form of birdwatching local tour guides (BLTGs), accommodations, local transfers, and spurs economic exchange in local markets. Avitourism contributes to ornithological knowledge and generates funding for protected areas (PA) (McCarthy et al., 2012).

Impediments to the Growth of Avitourism Destinations

Lack of species abundance and rarity, lack of man-made infrastructure (e.g., approach roads, accommodations, birding hides, trails, canopy walkways, etc.), socio-political instability, inhospitable environmental conditions, exclusion of sites from tour operator itineraries, lack of BLTGs, permit issues, and land tenure arrangements are the primary obstacles to the establishment and growth of avitourism destinations (Orenstein et al., 2010; Steven et al., 2014). Lack of bird-related information also discourages avitourists from visiting a particular avitourism destination (Orenstein et al., 2010). Remote local communities lack financial resources. Birdwatching is an expensive activity due to the apparatus required for remotely observing birds without disturbing them. However, the economic valuation of avitourism can help policymakers realise its potential and further stimulate them to invest in tourism infrastructure (Czajkowski et al., 2014).

Concerns related to Avitourism

Avitourism can put additional pressure on the survivability of bird species. The increased zeal of avitourists to view or photograph birds leads to unethical practices on the ground. Avitourists can disturb the birds during their breeding season, causing nest abandonment and predation of chicks. Certain bird species, especially threatened and near-threatened species, are sensitive to human presence. Such behavioural traits develop due to their biology, increased exploitation, and disturbances caused by birdwatchers who seek them out (Sekercioglu, 2002).

The use of artificial bird calls for flushing birds out in the open is prevalent in avitourism. It is a perplexing method that attracts significant debate among birdwatchers regarding its use (Sibley, 2011; Watson et al., 2018). The main concern with the use of such aids is the potential adverse psychological and behavioural change

in the species due to prolonged exposure to the artificial environment in terms of time and frequency, especially in its breeding characteristics. Other indirect negative impacts of avitourism include resentment and reluctance towards conservation policies by excluded community members, habitat clearance due to tourism infrastructure development, and tourism-induced pollution at the destination (Sekercioglu, 2002). However, evidence from the tropics is lacking to substantiate these findings due to a lack of long-term and well-designed studies (Burger & Gochfeld, 1993; Groom et al., 1991; Sekercioglu, 2002).

Design Thinking

Design thinking (DT) is a human-centric, systematic approach to innovation (Brown, 2008; Mahato et al., 2021). The first book on DT "creative engineering" by Arnold (1959), focused on DT as a creative approach for designing products that have new functions, lower production costs, and better scalability as well as better efficiency (Schraven et al., 2021). The DT approach tries to adopt a comprehensive understanding of end users' needs, wants, likes, and desires. Design thinkers then attempt to mould their innovations into new products and services that meet these requirements (Konar et al., 2018). These DT approaches come in the form of multi-stage DT models, which conceptualise the DT process as a "system of overlapping spaces" (Brown, 2008; Brown & Wyatt, 2010; Tschimmel, 2012). The process is iterative and not necessarily organised as a sequence of steps (Stickdorn & Schneider, 2012).

IDEO's 3I Model for Social Innovation

In this article, we will discuss and implement IDEO's 3I DT model for design thinking. IDEO is a renowned design and consulting firm that was founded in Palo Alto, California, in 1991. The firm specifically designed the 3I DT model in 2001 in the context of social innovation (Brown, 2008; Brown & Wyatt, 2010; Grimm et al., 2013). Social innovation refers to the development of novel products and services to meet social needs, i.e., healthcare, learning environments, etc. (Grimm et al., 2013; Mulgan, 2006). These products and services aim to contribute to the creation of more sustainable, harmonious, and equitable societies (Grimm et al., 2013). There are other DT models that are similar to the IDEO 3I DT model, such as the IDEO hearing, creating, and delivering model; the Hasso-Plattner Institute model; and the service design thinking (SDT) model. Compared to these models, the IDEO 3I DT model is known for its simplicity and practicality, rapid prototyping, proven success record for solving social problems, and cross-disciplinary nature (Brown, 2008; Grimm et al., 2013; Kelley & Littman, 2001).

The IDEO 3I DT model is divided into three distinct stages: inspiration, ideation, and implementation. The inspiration phase consists of framing the design challenge, building a diverse team, and conducting secondary research. In this stage, the designer has to study and include communities in a participatory approach to gain deeper insights. The ideation phase encompasses the collaborative analysis of data obtained during the inspiration phase, recognising potential design opportunities, generating ideas, and involving the community to provide feedback. Iteration, idea refinement, prototype creation, and incorporating user feedback are critical at this stage. The third phase, i.e., implementation, consists of live prototyping for feedback, business model refinement, network formation, and piloting of the idea. Resource building/ development, implementation team building, financial strategising, setting milestones for success, and user feedback are integral processes of this phase (Brown, 2008; IDEO, 2015; Mahato et al., 2021).

Study Area

This study was conducted in Dosdewa village, Karimganj, India (24.36° N, 92.34° E). Karimganj is the southernmost district of the Indian state of Assam. It shares its borders with Bangladesh in the west, and two different Indian states, namely Tripura and Mizoram in the south. This village is inhabited by approximately 70 families belonging to the Khasi community. The Khasis are an Austroasiatic-speaking ethnic tribe with a significant presence in the Barak Valley of Assam. For their livelihood, Khasis of Dosdewa cultivate betel leaves and areca nuts. The villagers also engage in fish farming. The village lies very close to Badsaitilla Reserve Forest (24.33° N, 92.35° E), a lowland dipterocarp forest.

Methodology

Design Thinking Tools

Eight DT tools were used at different stages of the DT process (Table 1). Fundamental tools for DT, including literature reviews, questionnaire survey, interviews, and observations, were used in the inspiration stage to achieve triangulation of the collected data. The ideation stage involved three tools, including brainstorming, sketching, and prototyping. The implementation stage involved learning experiences/ test tools.

Table 1. Design thinking tools used during this study

Tools	Description	Purpose
Inspiration stage		
Literature review	A literature review is conducted to extract relevant information from published sources, summarising the key findings and insights of past research or projects in relation to the current topic (Martin & Hanington, 2012).	A literature review was undertaken to collect insights from related studies to understand the characteristics of avitourists and to identify the challenges hosts face for running an avitourism destination independently for questionnaire design.
Questionnaire survey	Surveys gather self-reported information from samples about individuals' attributes, thoughts, feelings, perceptions, behaviours, and attitudes (Martin & Hanington, 2012).	Surveys were conducted to gain insights regarding the demographic profile of avitourists visiting Assam; and their needs, requirements, and expectations from an avitourism destination.
Interview	Direct one-to-one interaction with the participant to collect first-hand personal accounts of experience, opinions, attitudes, and perceptions (Martin & Hanington, 2012).	Interviews were conducted with the community-level stakeholders to gain insights into their shortcomings in delivering avitourism services and their concerns.
Observation	Observation is the visual examination and methodical documentation of a phenomenon. This may include people, environment, artifacts, events, behaviours, and interaction (Martin & Hanington, 2012).	Casual observation was undertaken to understand the way of life at Dosdewa, to identify the habitat type and the challenges for conducting avitourism activities inside the jungle; and villagers' interaction with birds and their habitat. Purposive and incidental species observations at Dosdewa are recorded on eBird.
Ideation stage		
Brainstorming	Traditionally, a discussion among participants/ stakeholders to generate a large number of ideas within a short period of time (Tschimmel, 2012).	Brainstorming sessions with community leaders were conducted to identify local solutions for addressing the impediments to avitourism activities in Dosdewa, with a special emphasis on the community's rich traditional knowledge system.

Table 1. (con't)

Tools	Description	Purpose
Sketching	Sketching involves freehand drawing of ideas into sketches for gaining new ideas and perspectives (Tschimmel, 2012).	A free-hand sketch of the modified version of the *Suh Sim Um* bird hunting technique was drawn on paper before the actual prototype was made.
Rapid prototyping	Expedited creation of tangible forms of concept for exploration, testing, and refinement (Liedtka & Ogilvie, 2011).	A prototype of the modified version of a bird hide was designed and its effectiveness in birdwatching was measured. Its effectiveness was measured based on the number of different species sighted with this technique.
Implementation stage		
Learning experiences/ tests	The prototype is provisionally launched for the end users to collect feedback and make necessary changes (Tschimmel, 2012).	The prototype was tested with avitourists, continuous feedback was received and improvements were made during the process.

Avitourist Questionnaire Survey

Based on existing literature, a questionnaire was designed for avitourists to identify their characteristics and trip-related behaviour. This information was required to empathise with the end-users of tourism products and services of Dosdewa. Initially, 41 avitourists who have visited different avitourism destinations in Assam were identified through their bird-related posts on Facebook, a social networking site, and eBird, an online database of bird observation. The initial contact was made either through Facebook or email. After obtaining their consent to participate in this survey, a semi-structured personal interview was conducted. The survey took place in 11 districts of Assam, namely in Dibrugarh, Tinsukia, Sonitpur, Jorhat, Golaghat, Baksa, Bajali, Morigaon, Nagaon, Kamrup Urban, and Barpeta, from September 2021 to October 2021.

The development of a structured questionnaire followed the identification of variables from the initial survey among the 41 avitourists. The questionnaire included questions regarding the demographic information of avitourists, the duration of their trips, repeat visit behaviour, birdwatching apparatus buying behaviour, and other trip-related information.

The final questionnaire was distributed among 200 avitourists who did an overnight birdwatching trip to the top five birdwatching destinations in Assam. These

sites were Manas National Park, Kaziranga National Park, Nameri National Park, Dehing Patkai National Park, and Maguri Beel (eBird, 2023a). Data collection took place during the 2021-2022 tourist season, from October 2021 to February 2022. A total of 164 usable responses (82%) were received. Not all respondents answered all the questions. This has led to different sample sizes for different questions. The analysis of various questions reflects this (Table 2).

Table 2. Demographic profile of avitourists

	Number of avitourists	**Participation rates (in percentage)**
Gender		
Male	130	79.3
Female	32	19.5
Marital Status		
Married	108	65.9
Single	48	29.3
Age		
16–24	11	6.7
25–34	35	21.3
35–44	36	22
45–54	30	18.3
55 and above	43	26.2
Educational Qualification		
Primary/ elementary education	1	0.6
High school	1	0.6
Undergraduate	12	7.3
Graduate	50	30.5
Postgraduate	73	44.5
Doctorate	24	14.6
Profession		
Government employee	31	18.9
Private sector employee	36	22
Self-employed	45	27.4
Student/ Researcher	21	12.8
Retired	21	12.8

Table 2. (con't)

	Number of avitourists	Participation rates (in percentage)
Monthly income in rupees*		
Up to ₹50,000	36	22
₹50,001–100,000	31	18.9
₹100,001–150,000	21	12.8
₹150,001–200,000	12	7.3
₹200,001–250,000	8	4.9
Above ₹250,000	28	17.1

*Yearly average currency exchange rate for 2022 for converting Rupees into US Dollars is 78.60 (IRS, 2022)

Documentation of the Bird Species

The availability of avian diversity is the prerequisite for introducing avitourism activities in any given location. As a result, documentation of bird species in Dosdewa is a continuous process. Any bird sightings in Dosdewa are diligently recorded on eBird. Bird observations have been conducted at five different locations along a forest trail inside Badsaitilla Reserve Forest. Later, bird hides were constructed in these locations to facilitate avitourism operations. Bird observation has been carried out in these locations during the winter months of October to March since 2016. For bird observations, DSLR cameras (Sony A7 IV with Sony 200-600mm G lens; Nikon D7200 with 150-500mm lens), Bridge cameras (Nikon P1000; Sony RX10 IV), a tripod (Monfrotto MT055XPRO3 055), and sound recorder (Zoom H6, Sony ICD-UX560F) were used.

Results

Inspiration

Questionnaire survey of avitourists visiting Assam

Avitourists mostly spent 2 nights on average at the birding locations in Assam. Travel time and multi-destination tour plans for Northeast India are the influencing factors for the limited period of stays at a single destination in Assam. The use of artificial bird calls was found to be significant. Eighty-eight individuals (54%) agreed that they had used artificial bird call aids for birdwatching for reasons other than education or surveys. Binoculars (N-128, 78%), SLR/ DSLR Camera (N-119, 73%), special clothes (N-90, 55%), tripod/ monopod (N-90, 55%),

telephoto lenses (N-80, 49%) were the most common equipment owned by the avitourists. The high count of cameras, monopods, and telephoto lenses indicates that avitourists in India actively pursue bird photography. Facebook (N-115, 70%), Youtube (N-109, 67%), and Instagram (N-91, 56%) are the platforms mainly used by the avitourists. The use of eBird (N-90, 55%) is significant among avitourists. The use of eBird signifies the contributions that avitourism makes to generating bird observation data. A significant number of first-time avitourists (N-42, 26%) visited Assam via tour operators and birdwatching guides.

Stakeholder Interviews

For the villagers, avitourism was a new concept. They had no prior experience dealing with avitourists. There was no economic value attached to the bird species found in Dosdewa. The villagers have extensive knowledge of bird species, but they do not know the English names of the birds. Nobody in the village used to keep a record of the birds seen in the area. Villagers continue to hunt bird species for consumption in Dosdewa, mainly using traditional sublime bird hunting techniques. During the interview, it was found that the local youths interested in becoming BLTGs in Dosdewa could not afford to purchase bird identification books or expensive birdwatching apparatus, such as binoculars, and cameras. There is no evidence of big cats or other large mammalian species in the Badsatilla reserve forest, thus limiting the risks of man-animal conflict.

Observations

Dosdewa lies in a remote location. During the rainy season, the approach road to the village becomes impassable for motor vehicles. Thus, avitourism in Dosdewa is a seasonal affair. Job burnout due to the monotonous work of BLTGs during high tourist footfall was one of the concerns that warranted attention for retaining local youths in this activity. The village is located on top of a hill with limited space. The number of tourists that can be accommodated at a time is very limited. A sick person, a person with a disability, or an elderly person may have difficulty climbing the terrain due to its steepness. The village also has a bad telecom network.

Villagers of Dosdewa use a perennial stream to enter Badsatilla Reserve Forest. The stream's depth is relatively shallow during the winter season, reaching only ankle-deep. The stream helps in eclipsing the noise of human footsteps with the sound of the flowing stream. The approach route to the forest also minimises disturbance and trampling of the bird habitat. However, birdwatching in Badsatilla reserve forests' dense dipterocarp habitat is difficult without the use of artificial aids such as bird calls.

Ideation

Brainstorming

The ideation process began with an exploration of the existing Khasi community's traditional knowledge systems. Traditional knowledge is defined as "a broad description of subject matter, generally includes the intellectual and intangible cultural heritage, practices and knowledge systems of traditional communities, including indigenous and local communities (traditional knowledge in a general sense or *lato sensu*)" (World Intellectual Property Organization, 2023). The Khasis use different kinds of sublime bird hunting techniques to hunt birds. It was observed that these techniques could be partly adopted for observing birds in their natural settings remotely using a bird hide.

Bird hides are used to ameliorate the disturbances caused by birdwatchers while observing birds (Ma et al., 2022). Bird hides could have been used with *Suh Sim* and *Suh Lynglit* sublime bird hunting techniques, in which fruiting trees and domesticated birds are used respectively to attract birds at a location before they are hunted down. However, the *Suh Sim Um* sublime bird hunting technique was chosen over these techniques for prototyping. This was mainly done because, in this technique, birds assemble near perennial water puddles during dry months, making the location for constructing bird hides static.

The Revised Version of Suh Sim Um and Bird-Hide Technique for Birdwatching

In Dosdewa, during the dry months from November to March, seasonal and perennial water sources dry up, leaving only a few puddles. These puddles are favourite spots for birds to drink water and take a bath. During these activities, birds usually sit on nearby tree branches or perches. The conventional hunting method entailed the insertion of glue sticks on these tree branches or perches to ensnare small birds. This step is removed from the revised version. Thus, the nearby tree branches, perches, and water puddles become excellent spots for observing and photographing birds.

Sketching

The concept emerging from the brainstorming session was visualised through sketching (Figure 1).

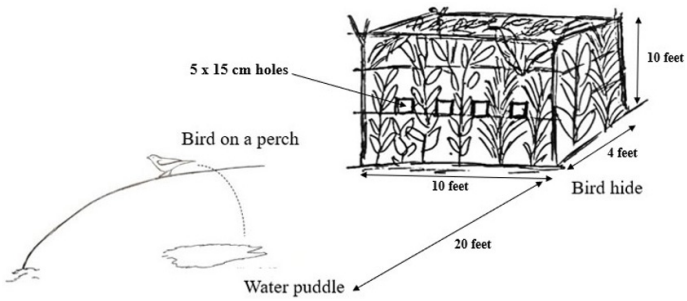

Figure 1. An illustration of the revised version of *Suh Sim Um* and bird-hide technique for birdwatching

Rapid Prototyping

For testing the fundamentals of *Suh Sim Um* and bird-hide technique, the second author first identified the water puddles used by birds inside the reserve forest in 2016. The author started to observe birds near these water puddles. It was observed that bird activities used to take off in the late afternoon (around 2 pm) and continued till dawn. The author used to camouflage himself amidst the natural vegetation. The natural vegetation of the dipterocarp habitat acted as a natural shield. This technique determined the minimum approach distance (MAD) to be 20 feet. MAD is the minimum distance that one should maintain from wildlife before initiating alert or escape behaviours (Fernández-Juricic et al., 2005). With the success of this technique, the first bird hide near the water puddle was constructed in 2017. Bird hides were constructed approximately 20 feet from the water puddles (Figure 1). Tree branches and bamboo were used to create the structure of the bird hides, which typically measured 10 by 4 feet in width and 10 feet in height. Bamboo, banana, and toco (*Trachycarpus martianus*) leaves covered the hides (Figure 2). At a time, 4 to 5 people can sit inside the hides. For each individual sitting inside the hide, a 5 by 15 cm hole on the wall at waist level facing the water puddles was constructed. These holes are used to house birdwatching apparatus, including camera lenses and binoculars.

Figure 2. Bird hides constructed using natural growth at Dosdewa

Implementation

Learning experiences/ tests

Bird observation in the area resulted in the documentation of 185 species in and around Dosdewa, which includes Badsatilla reserve forest (eBird, 2023b). The revised version of Suh Sim Um and bird-hide technique were actively used for birdwatching activities in Dosdewa. The bird hides were constructed using locally available vegetation, which reduced the construction cost. Bird hides are positioned at 20 feet from the water puddles, making it possible for the ill-equipped BLTGs to detect and identify birds without any optical aids. These guides are responsible for constructing and maintaining the bird hides. Typically, they accompanied the authors during birdwatching sessions. During these sessions, repeated encounters with the same species helped them become familiar with the species' English names.

The revised version of *Suh Sim Um* and bird-hide birdwatching technique is an effective way of observing birds (40 species observed), especially Passeriformes. The species count was observed to be highest (14) from the family Muscicapidae. Tynsong et al. (2012) discovered 15 additional bird species, two of which were unidentified, using the traditional *Suh Sim Um* hunting technique. Thus, it is safe to conclude that the traditional hunting technique is effective in viewing 55 species. One of the rare species observed using the revised version of this technique in Dosdewa includes the Asian Stubtail (*Urosphena squameiceps*) of the Scotocercidae family. The Asian Stubtail is a resident species of the Asia Pacific region, yet it is vagrant to India with only 10 photographic evidences from the Indian subcontinent (Gassah & Ismavel, 2019a). Another vagrant species observed was the Siberian Blue Robin (*Larvivora cyane*) of the Muscicapidae family. This species breeds in Russia and Japan and migrates further down Southeast Asia towards Malaysia, Borneo, and Thailand during the winter (Gassah & Ismavel, 2019b).

The avitourists provided two crucial pieces of feedback on the revised version of *Suh Sim Um* and the bird-hide birdwatching technique:

1. It was recommended that bird hides be strategically constructed near water puddles that receive the longest duration of daylight to facilitate better photography.
2. Bird hides should have sitting areas at knee level, as avitourists often need to sit for extended periods (over 3 hours at a time).

These recommendations were incorporated during the construction of new bird hides. A list of species sighted using this technique in Dosdewa over the years is presented in Table 3.

Table 3. Bird species sighted using the revised version of *Suh Sim Um* and bird-hide birdwatching technique

Family	Scientific Name	Common Name	Record type
Chloropseidae	*Chloropsis cochinchinensis*	Blue-winged Leafbird	Seen/ photographed
Corvidae	*Cissa chinensis*	Common Green-Magpie	Seen/ photographed
Dicruridae	*Dicrurus aeneus*	Bronzed Drongo	Seen/ photographed
	Dicrurus remifer	Lesser Racket-tailed Drongo	Seen/ photographed
	Dicrurus paradiseus	Greater Racket-tailed Drongo	Seen/ photographed
Leiothrichidae	*Alcippe poioicephala*	Brown-cheeked Fulvetta	Seen/ photographed
	Alcippe nipalensis	Nepal Fulvetta	Seen/ photographed
	Garrulax monileger	Lesser Necklaced Laughingthrush	Seen/ photographed
	Pterorhinus pectoralis	Greater Necklaced Laughingthrush	Seen/ photographed
Monarchidae	*Hypothymis azurea*	Black-naped Monarch	Seen/ photographed
Muscicapidae	*Copsychus malabaricus*	White-rumped Shama	Seen/ photographed
	Cyornis poliogenys	Pale-chinned Blue Flycatcher	Seen/ photographed
	Cyornis unicolor	Pale Blue Flycatcher	Seen/ photographed
	Cyornis rubeculoides	Blue-throated Flycatcher	Seen/ photographed
	Cyornis whitei	Hill Blue Flycatcher	Seen/ photographed
	Niltava macgrigoriae	Small Niltava	Seen/ photographed
	Niltava Sundara	Rufous-bellied Niltava	Seen/ photographed
	Eumyias thalassinus	Verditer Flycatcher	Seen/ photographed
	Brachypteryx leucophris	Lesser Shortwing	Seen/ photographed
	Larvivora cyane	Siberian Blue Robin	Seen/ photographed
	Ficedula hyperythra	Snowy-browed Flycatcher	Seen/ photographed
	Ficedula hodgsoni	Pygmy Flycatcher	Seen/ photographed
	Ficedula westermanni	Little Pied Flycatcher	Seen/ photographed
	Ficedula albicilla	Taiga Flycatcher	Seen/ photographed
Pellorneidae	*Pellorneum ruficeps*	Puff-throated Babbler	Seen/ photographed
	Malacocincla abbotti	Abbott's Babbler	Seen/ photographed
Pittidae	*Hydrornis nipalensis*	Blue-naped Pitta	Seen/ photographed

Table 2. (con't)

Family	Scientific Name	Common Name	Record type
Pycnonotidae	*Brachypodius melanocephalos*	Black-headed Bulbul	Seen/ photographed
	Rubigula flaviventris	Black- crested Bulbul	Seen/ photographed
	Alophoixus flaveolus	White-throated Bulbul	Seen/ photographed
	Lole cacharensis	Cachar Bulbul	Seen/ photographed
	Hemixos flavala	Ashy Bulbul	Seen/ photographed
Scotocercidae	*Urosphena squameiceps*	Asian Stubtail	Seen/ photographed
Stenostiridae	*Culicicapa ceylonensis*	Gray-headed Canary-Flycatcher	Seen/ photographed
Sturnidae	*Gracula religiosa*	Common Hill Myna	Seen/ photographed
Timaliidae	*Mixornis gularis*	Pin-striped Tit Babbler	Seen/ photographed
	Stachyris nigriceps	Gray-throated Babbler	Seen/ photographed
Turdidae	*Geokichla citrina*	Orange-headed Thrush	Seen/ photographed
	Turdus dissimilis	Black-breasted Thrush	Seen/ photographed
Vireonidae	*Erpornis zantholeuca*	White-bellied Erpornis	Seen/ photographed

Dosdewa has been promoted as an avitourism destination. The host actively engages with tour operators and conducts avitourism tours in Dosdewa on their behalf. The host also promotes Dosdewa on the most popular digital platforms used by avitourists, namely Facebook, YouTube, and Instagram. Word-of-mouth (WoM) on social media and social networking platforms allows avitourists to make independent travel decisions by expanding their knowledge about the products and services on offer (Islam et al., 2023). This effectively reduces the influence of middlemen and economic leakage.

Direct income opportunities have been created in the form of homestay operators, cooks, and BLTGs in Dosdewa. Currently, seven individuals are directly involved as BLTGs. Apart from them, four others help during peak season to reduce job fatigue. Local transfer operators, grocery shop owners, and meat shops earn indirect income. The tourism carrying capacity of the village is limited to four individuals at a time. This is because only one homestay is currently operational in the village. The locals are making efforts to construct another homestay with a carrying capacity of 10 individuals at the foot of the hillock. The existing homestay is promoted as a no-frills, basic but comfortable accommodation. The service-oriented activity has infused an additional income of US $7,000 into the local economy from October 2021 till March 2023.

Discussion

This study aims to establish Dosdewa as a sustainable avitourism destination. To achieve this, the IDEO 3I DT model (Fig. 3) was employed to identify and address the obstacles faced by local communities in establishing Dosdewa as an avitourism destination through social innovation. This was done to reduce the involvement of external stakeholders and to increase the benefits of the host community.

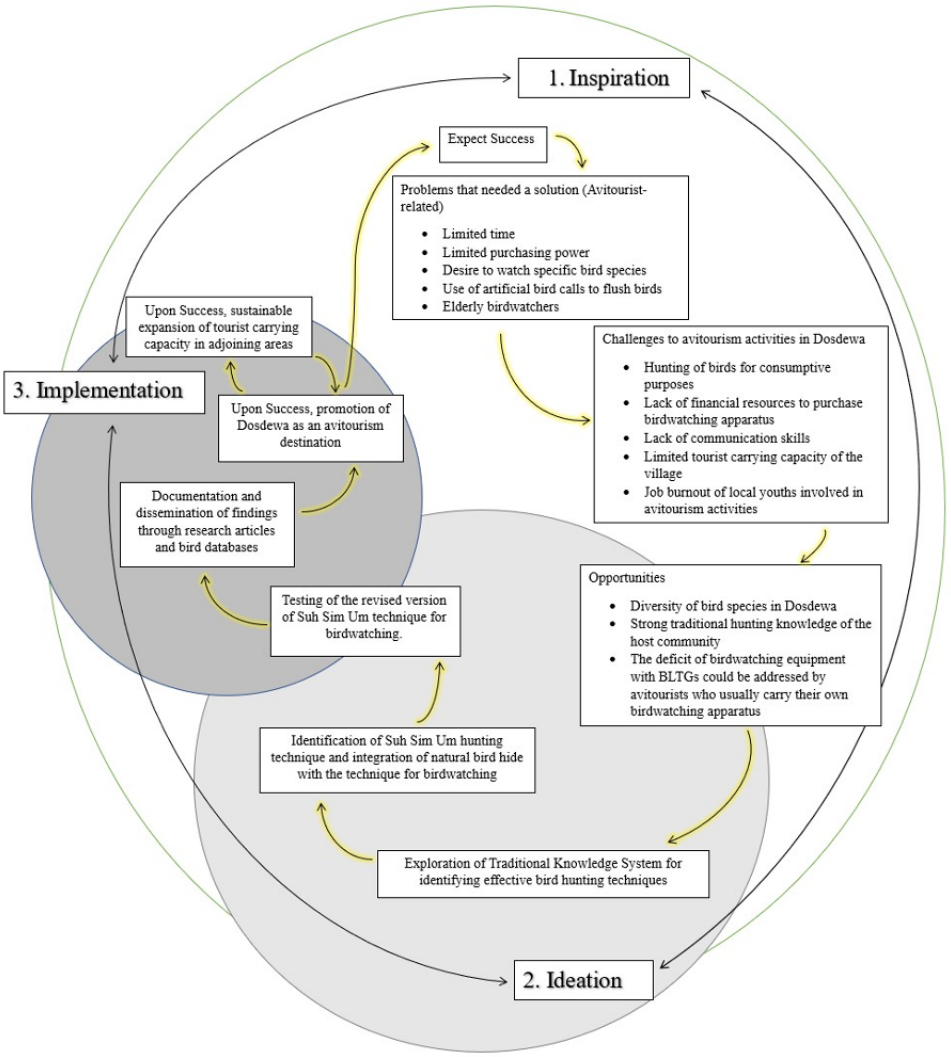

Figure 3. The design thinking process at Dosdewa (Adopted from Brown, 2008)

During the exploration stage, it was found that avitourists visiting Assam were mostly male, married, belonged to the middle and old age groups, and were highly educated. However, avitourists in India are comparatively less affluent and have less disposable time than their anglophone counterparts (Chen & Chen, 2015; Sekercioglu, 2002; United States Fish and Wildlife Service, 2019). In India, avitourists actively pursue bird photography. Avitourists embark on multi-destination, short-duration trips. This indicates that avitourists want to observe or photograph birds in the least possible time. This need for instant gratification can encourage the use of artificial bird call playbacks during birdwatching.

Dosdewa is home to a rich bird diversity. However, the local community still hunts birds for consumption. The emergence of urban markets increases the commercial value of bushmeat (Liang et al., 2011). Attaining this commercial value for any bird species can turn selective or mass bird hunting into a profitable business in Dosdewa. This warranted a realisation of the non-consumptive commercial and conservation value of bird species found in Dosdewa to promote conservation activities. With an average monthly income per agricultural household of US $130 (Press Information Bureau, 2019), the additional revenue of US $7,000 generated through avitourism activities in Dosdewa represents a significant non-consumptive commercial and conservation value of birds.

The innovative *Suh Sim Um* and bird-hide birdwatching technique successfully met the needs and requirements of avitourists while minimising the use of artificial bird call playbacks and the negative impacts of avitourism activities. Birdwatchers always keep a safe distance from the birds, maintaining the MAD. Reduced approach distances aided in bird photography and allowed ill-equipped BLTGs to observe and identify birds with their naked eyes. The limited mobility of avitourists helped reduce trampling and damage to bird habitats. This technique also alleviated birdwatching fatigue, particularly among elderly birdwatchers, resulting from strenuous walking sessions over long distances. Such diversification of traditional knowledge systems and the realisation of their values promote the conservation of intangible natural heritages of communities that are rarely recorded and are on the verge of extinction (Tynsong et al., 2012). The birdwatching and avitourism activities in Dosdewa helped in the documentation of over 185 species of birds in and around Dosdewa (eBird, 2023b). This contributed to a better understanding of the species distribution and abundance at Dosdewa.

Conclusion

The IDEO 3I is an effective and systematic DT approach to tourism destination development. This study used data from 164 avitourists who visited Assam to identify their needs and requirements. To address their specific demands, the

avitourism destination, Dosdewa, implemented social innovations through a user-centric approach. *Suh Sim Um*, a traditional bird-hunting technique of the Khasi community, underwent purposeful modification to meet avitourist demands and mitigate the potential negative impact of avitourism activities in Dosdewa. This technique is cost-effective, indigenous, non-obstructive, non-intrusive, and non-consumptive. Avitourism activities in Dosdewa generated a significant amount of revenue, enabling the local community to realise the non-consumptive commercial and conservation values of bird species.

Theoretical Implications

This study, in part, addresses the gap in avitourism literature, which has failed to provide a holistic view of its social, economic, and ecological relationships (Steven et al., 2014). This is one of the very few explicit studies on avitourism industry in India. Existing literature lack evidence of tangible socio-economic benefits gained by local communities in India, which has been demonstrated in this study (Steven et al., 2014). The present study expands the existing literature on the DT process for sustainable innovation in tourism. More often, studies have highlighted a lack of explicit linkage between the DT process and sustainability (Li et al., 2019; Ioannou & Meletiou, 2011). This study bridged this gap by combining the modern, experience-oriented IDEO 3I DT model with the Khasi community's age-old traditional knowledge system to achieve sustainable practices in avitourism operations. This study documented the rarely studied effectiveness of bird hides for birdwatching (Ma et al., 2022) and their role in mitigating the negative impacts of birdwatching. This study also determined the MAD (in case bird-hide is used) for 40 species of birds in a dipterocarp habitat.

Practical Implications

Primitive hunting of birds among different indigenous tribes is still prevalent in remote areas with rich bird diversity. The realisation of the non-consumptive commercial and conservation value of bird species can discourage these practices. Given the potential to achieve this and spur sustainable socio-economic changes in remote areas, governments must incorporate avitourism into their tourism policies. Avitourism activities also help in documenting species diversity and distribution data, which can initiate conservation activities. Policymakers can strategically equip BLTGs with birdwatching equipments, such as binoculars, bridge cameras, and camouflage clothing. Rigorous training on ethical birdwatching practices, and certifications should be provided to BLTGs. Local communities should actively utilise their traditional knowledge systems to develop sustainable solutions for birdwatching. Further, hosts should exercise caution when promoting sensitive

avitourism destinations on digital platforms. Promotional activities should be directed towards the niche tourist segment to prevent over-tourism and its negative impacts.

Limitations and Future Research

This study mostly explored the demographic and trip-related characteristics of avitourists visiting Assam. Future studies can explore the motivational factors and conservation attitudes of Indian avitourists, which mostly remain unknown. The results of this study on the effectiveness of the modified version of *Suh Sim Um* and bird-hide birdwatching technique are limited to the dipterocarp habitat of Dosdewa. Thus, future studies should evaluate the effectiveness of bird hides in different types of habitats.

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