Research Paper

# Perception-satisfaction based quality assessment of tourism and hospitality services in the Himalayan region: An application of AHP-SERVQUAL approach on Sandakphu Trail, West Bengal, India

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## ARTICLE INFO

## ABSTRACT

About 800 million people, or about 12% of the world's population, go abroad annually, making tourism one of the greatest global enterprises. The Himalayan region's nature and adventure-based tourism has a significant economic influence on West Bengal, India. The Singalila Range is well-known among tourists and trekkers from all over the world for its distinctive features and dynamic environment. The modified AHP-SERVQUAL model covering service provision attributes was studied in the subject of a case study in the Sandakphu Trail, Darjeeling, India, to determine critical dimensions. The most significant subdimension is deemed to be promptness of services, while the responsiveness dimension needs the most improvement in terms of providing excellent service. The discrepancy between tourists' perceptions and satisfaction with the tourism and services offered in the Sandakphu Trail, which is nestled in the Himalayan region of India, is critically examined in this topic based on Overall Tourism Satisfaction Index (OTSI). In order to evaluate the gaps in terms of tangibility, reliability, responsiveness, assurance, and empathy which eventually leads us to the assessment of the tourism and hospitality services in the Sandakphu Trail of the Himalayan region of India, this study has combined the methodologies of the AHP-SERVQUAL model. The OTSI data for the halting points, i.e., Mane Bhanjang (33.38), Meghma (42.53), Tumbling (67.23), Gairibus (42.14), Kalpokhri (44.70), and Sandakphu (65.79), demonstrate inconsistencies in the gap in the tourism services in these locations. As part of an operational research on management, this approach used in the study provides us with a clear understanding of the quality of tourism services in a straightforward manner without the need for quantitative data, which will be useful in proper tourism and hospitality service planning and management.

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## 1. Introduction

Being one of the largest and fastest-growing industries, tourism makes a significant contribution to the economic sectors globally (Khairun, Mahrinasari, & Pandjaitan, 2022). Prior to the pandemic, 10.3% of all jobs (333 million), 1 in 4 of all new jobs produced globally, and world's GDP of USD 9.6 trillion (including its direct, indirect, and induced consequences) were all related to tourism (World Travel and Tourism Council, 2022).While the travel and tourism industry's contribution to GDP decreased by about USD 4.9 trillion (50.4%) in 2020, it grew by USD 1 trillion (21.7%) in 2021 (Khairun et al., 2022; World Travel and Tourism Council, 2022). Today's top concerns in travel and tourism management are service delivery and customer happiness in order to compete in this quickly expanding market (Kowalska & Ostrega, 2020). The area call will be in jeopardy as long as there is a discrepancy between expectations and the perceived nature and qualities with relation to tourism services (Gaffar & Kumar, 2021; Ghose & Johann, 2018). One of the most popular treks in the Darjeeling Himalayan region in India is the Sandakphu-Phalut Trail.[1] During the two main seasons, namely autumn and winter, hotels and homestays along the Sandakphu Trail in West Bengal, India, provide tourism services to travelers and trekkers. Due to its distant location and minimal transportation infrastructure, the service offered by the tourism sector is considerably different from that of other utility services which occasionally causes an array of problems for travelers and hikers. This study has tried assessing the state of tourism satisfaction where the gap between expectations and perceptions of tourist services along the Sandakphu Trail in Darjeeling, West Bengal has been taken into account.

Several scholars around the world have developed a variety of measures and techniques to evaluate the tourist and customer satisfaction quotient of various service facilities in spatial contexts. SERVQUAL model developed by Parasuraman, Zeithaml, and Berry (1985) serves as an analytic tool that would assist service providers to assess their strengths and deficiencies (Marković, 2005; Njau, Mutungi, & Mutinda, 2019). This model consists of five essential service factors: tangibles, reliability, responsiveness, assurance, and empathy. The five-dimension framework of SERVQUAL model, according to Parasuraman et al. (1985); Parasuraman, Berry, and Zeithaml (1991), enables researchers to evaluate the level of service quality both globally and along each dimension. According to Gholami, Jabbari, Kavosi, and Gholami (2016) and Shafiq, Mostafiz, and Taniguchi (2019), SERVQUAL model is reportedly utilized in a variety of service-related industries. With a focus on the joint contribution of the various service quality dimensions, variables, and tourist satisfaction in the industry, Ukwayi, Eja, and Unwanede (2012) used the SERVQUAL method to critically examine visitors' perceptions of the hotel industry in Cross River State where Guiry, Scott, and Vequist (2013) also used the SERVQUAL questionnaire to develop a customer satisfaction survey (Saravanan & Rao, 2007). Several sectors have unique characteristics; therefore, how they operate has a big impact on what customers expect from service providers (Alam & Mondal, 2019).

Tanford, Raab, and Kim (2013) expanded the scope of the questionnaire, which may run the risk of obscuring the results' clarity. Although there are some advantages to employing this technique, there are also some drawbacks, such as measuring the expectations of excellence, which can occasionally be nonexistent, poor discrimination between the dimensions, and complexity making assumptions gap analysis for other fields (Ghose & Johann, 2018; Markovic & Raspor, 2010; Titu, Răulea, & Țîțu, 2016). Awasthi, Chauhan, Omrani, and Panahi (2011) employed SERVQUAL, and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) approach was integrated to evaluate the delivery of urban transportation services in the Canadian city of Montreal. In addition, Mahrotra and Bhartiya (2020) also applied SERVQUAL for mapping the patients expectation as healthcare benchmarking in the competitive world. The available research demonstrates that the SERVQUAL model is the most popular model for evaluating the quality of services in a variety of industries, including health care (Asim, Siddiqui, Malik, Nawaz, & Ali, 2017; Budhwani, Hearld, & Harbison, 2015; Kapiki, 2012; Kitapci, Akdogan, & Dortyol, 2014), academic institution service delivery (Budhwani et al., 2015; Gu & Page-Jarrett, 2018; Wankar, 2014), insurance and finance (Manzoor, Wei, Hussain, Asif, & Shah, 2019), tourism satisfaction (Ghose & Johann, 2018; Tanford et al., 2013; Titu et al., 2016), transportation (Khurshid, Naeem, Ejaz, Mukhtar, & Batool, 2012; Ojo, Nutsogbo, & Appiah-Mintah, 2014) and other utility services.

The Analytical Hierarchical Processing (AHP) model is employed in this study to create a pairwise comparison of the five aspects of service quality based on subject-matter expertise (Chang, 2009; Markovic & Raspor, 2010). AHP is a potent and widely used technique for creating comparisons between many criteria, prioritising weights and ranking the criteria according to expert opinion (Mondal et al., 2021; Ocampo et al., 2014; Yang, 2022). According to many decision-making criteria that were discovered through examining and processing 103 samples, Khairun et al. (2022) were able to identify and rank the most desirable tourist destination and the corresponding location among a group of possibilities. Due to its adaptability for usage in situations when there is not enough information on the examined options in decision making (Basak, Bose, Roy, Chowdhury, & Chandra, 2021; Roy, Bose, Singha, Basak, & Chowdhury, 2021; Wickramasinghe & Takano, 2009), this study uses the AHP method (a technique of multiple criteria decision-making, MCDM). Using AHP, Xie, Qian, and Wang (2021) determined the values of each parameter and empirically scaled the index for the perceived service value in each of the three scenarios. One key conclusion is that Tang Paradise provides very good service quality, earning a global score of 4.35. This is because the attraction integrates all aspects of Tang Dynasty culture to give each tourist an unforgettable experience. Many scholars (Abedi, Shafei, & Kalantari, 2012; Awasthi et al., 2011; Yang, 2022) worldwide have employed a combined methodology of AHP-TOPSIS and AHP-SERVQUAL to quantify the discrepancy between perceived and expected service quality (Chakrabarty & Mandal, 2018; Hanafiah & Zulkifly, 2019; Ocampo et al., 2014; Roy et al., 2022).

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[1] Trail is a path or track roughly blazed through wild or hilly country.

This study employs a hybrid technique that combines SERVQUAL and AHP to assess the level of service provided by the tourism industry along the Sandakphu Trail in West Bengal, India. To quantify the tourism service condition of Sandakphu Trail in West Bengal, India, an Overall Tourism Satisfaction Index (OTSI) has been established based on the gap score from the SERVQUAL model and the weight of the dimensions from the AHP model. This study has novelty from the idea of tourists' expectations and develops a sustainable, healthy, and environmental friendly tourism purpose, which is believed to be beneficial in resource targeting for increasing the tourism service quality of the Sandakphu area.

## 2. Material and methods

### 2.1. Study area

Literally translated as "height of the poison plants," aconites, which bloom on the highest hill in both West Bengal and Darjeeling, are known as Sandakphu. Many tourists may not be familiar with Sandakphu, but for the ardent adventurer or the genuine trekker, it is the ideal location (Fig. 1). This little village is perched atop the state's tallest peak, the namesake peak, in the Darjeeling District of West Bengal, on India's easternmost frontier (Gaffar & Kumar, 2021). The ascent to this hill station's 3,636 m highest point will reward you with a breathtaking view that will leave you absolutely mesmerized. The difficult trip, which takes three to four days to complete, is definitely worth for the exceptional and unparalleled view which nature has to offer us (Chakrabarty & Sadhukhan, 2018). The journey to Sandakphu, which is northwest of Darjeeling Town, is full of exciting experiences (see Fig. 1). The greatest spot for a beginner adventure traveler to start is on this 32 km adventure path that follows the Singalila Range (Sadhukhan & Chakrabarty, 2018). The finest seasons to visit Sandakphu, one of the most picturesque trekking terrains, are April to May (spring) and October to November (post monsoon). But only the most seasoned trekkers and zealous adventurers dare to witness the stark beauty of snow-covered Sandakphu in the chilly winter month. Mane Bhanjang, also known as the "Gateway to Singalila and Sandakphu," is where the 12-hour walk to Sandakphu actually begins (Wangel, 2006). The important rest stops along this tourist route are Meghma, Tumbling, Gairibus, Kalpokhri, and Sandakphu (the ultimate destination). The lodging along the Sandakphu Trail is primarily simple and basic (Chakrabarty & Sadhukhan, 2018). There are no extras and only staples in the rooms. There is a dearth of urban luxuries here and one would be disappointed if he/she comes here with a lot of high expectations. Front-facing rooms cost between INR 2,000 and 3,000 per day in majority of the hotels. Rent can be paid for the space heater. The food is plain and somewhat expensive; a dish of straightforward vegetarian fare costs INR 200 (Anandabazar, 2022).

Since the middle of the eighteenth century, the Darjeeling region of India has been renowned for its attractive hill towns (Paul, 2014), which served as bases for the forerunners of climbers and trekkers (Zurick & Pacheco, 2006). They provide excellent opportunities for climbing and trekking despite being much lower in elevation as compared to the Sikkim Himalayas in the north. The Singalila Mountain Range separating India from Nepal and a home to Singalila National Park (Fig. 2), is one of the greatest routes (known as Sandakphu-Phalut Trail) for tourist and trekkers (Gaffar & Kumar, 2021; Sadhukhan & Chakrabarty, 2018). The Great Himalayas may be seen from the surrounding peaks, such as the tallest Sandakphu Mountain (3,620 m), with Kanchendzonga at the top and Mount Everest in the horizon. The Sandakphu Trail typically begins in Mane Bhanjang and finishes in Sandakphu for the majority of visitors and hikers due to the track's location between a forest and a road, while many trekkers attempt to reach Phalut through hiking beyond Sandakphu. Meghma, Tumling, Gairibus, and Kalpokhri are popular locations for a night's rest and a fresh start the following morning (Sadhukhan & Chakrabarty, 2018).

### 2.2. Research methodology

#### 2.2.1. Questionnaire design

This study uses an integrated SERVQUAL and AHP methodology to evaluate the quality of the tourism services provided along the Sandakphu Trail in the Indian Darjeeling hills. A total of 21 questions about sanitation service quality are included in the SERVQUAL questionnaire, which is divided into five categories: tangibility (5 questions), reliability (5 questions), responsiveness (4 questions), assurance (4 questions), and empathy (4 question). Based on an intensive literature research and interviews with subject-matter experts, the questions of the aforementioned aspects are chosen. For the benefit of experts and residents in slums, the questionnaire has been designed in both English and Bengali. The linguistic expressions "strongly disagree" and "strongly agree" are anchored to the numbers 1 and 5 on the five-point Likert scales used to assess the survey items.

#### 2.2.2. Sampling and data collection

According to official information obtained from the Manebhanjang Tourist Office, this trail saw up to 475–500 trekkers in 2018 and 2019 before COVID-19 broke out. Due to the early nature of this experiment, just one individual from each family was interviewed for each tourist and trekker on the Sandakphu Trail in order to assess the discrepancy between perception and expectation. Due to time and resource constraints, a random sample of 110 tourists and trekkers was chosen for the SERVQUAL questionnaire survey using a basic random sampling process, maintaining a 95% confidence level and a 95% margin of error. Out of the 110 respondents participating in the questionnaire survey, 45 were trekkers and 65 were visitors. Between November 2021 and April 2022, data on the respondents' expectations and perceptions were gathered. Nearly 70% of the population was determined to be between the ages of 25 and 40 during the study, and out of 110 respondents, 68 were men. Recent years have seen a rise in popularity for trekking. Any hike benefits from having the right equipment. Outfitters have created some of

**Fig. 1.** (a) Sandakphu Trail in 3D. (b) Halting points at Sandakphu Trail. (c) Land rover used for tourist at Sandakphu Trail. (d) Meghma. (e) Kanchendzonga viewed from Tonglu. (f) Toward Gairibus from Tumling. (g) Sandakphu Trail. (h) Kalpokhri. (i) Atrekker during Sandakphu Trail. (j) Massive Kanchendzonga viewed from Sandakphu Base of Darjeeling hills, West Bengal.

the best outdoor gear to meet the challenging weather and trail conditions, but even the best gear cannot guarantee your safety or health if you are unprepared or irresponsible before your adventure. Such issues are encountered by hikers in Sandakphu because the majority of them are discovering this path for the first time.
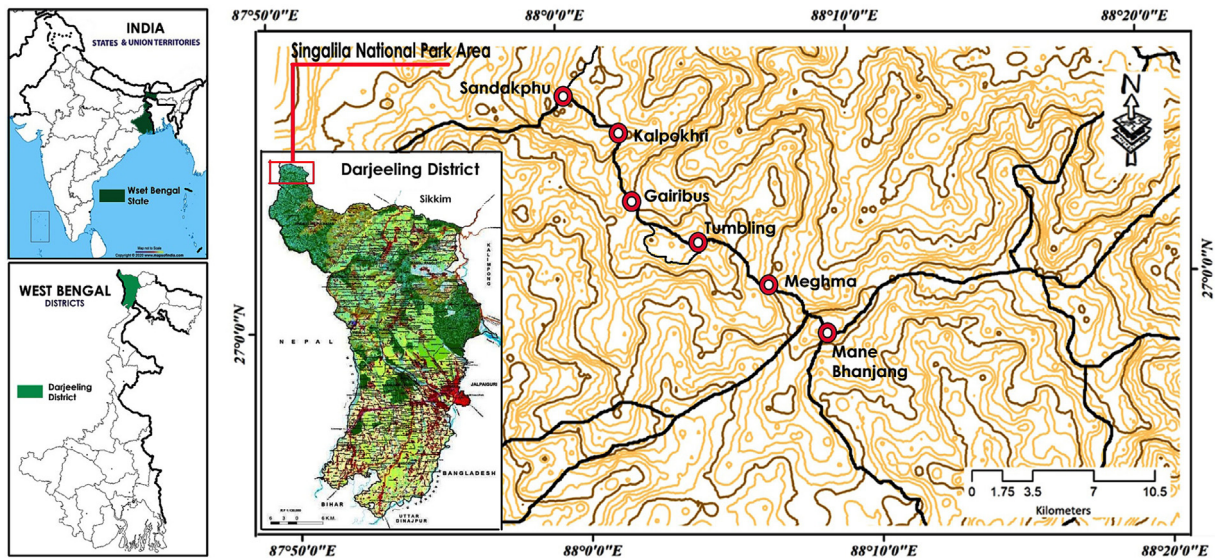
**Fig. 2.** Location of Sandakphu Trail in Singalila National Park, Darjeeling, India.

Due to the ongoing COVID-19 restrictions, the authors were unable to find any international tourists in the study region then. All the surveyed tourists are domestic in nature. The participan ts gave their written informed consent for the publication of their de-identified information in this article. The questionnaire was divided into two sections, the first of which asked about the respondents' demographic information and the second of which asked about the factors associated with tourism service satisfaction. Six expert surveys with hoteliers, tour guides, and drivers were conducted after all the perception and expectation data from tourists and trekkers of the Sandakphu path were gathered to determine the weight of the five SERVQUAL questionnaire aspects.

### 2.2.3. Methods

This section discusses the phase-by-phase construction of a hybrid technique, which includes defining the study subject, conducting a thorough literature search, choosing the variables, selecting the sample size, creating and pre-testing the questionnaire, and ensuring scale reliability. A thorough literature search was conducted to see whether any studies had been done in the Darjeeling hills of India. The study's main objective was to assess the quality of tourism services offered along the Sandakphu Trail in those mountains. Since there is limited information about the quality of tourism services in the Himalayas, a thorough study of international literature and the opinions of experts were gathered to create the research (Mondal et al., 2021). The questionnaire items, methodologies, validity, and reliability of the questionnaire, as well as the weight of the five dimensions, were designed in this study based on an exhaustive and in-depth assessment of the literature and the opinions of experts.

The proposed hybrid methodology (combining SERVQUAL and AHP) is described in four extensive parts, the steps of which are delineated as follows:

Step 1: Researchers typically use Chronbach's alpha ($\alpha$) to determine whether the items selected for the questionnaire are measuring the target construct or not.

Step 2: Based on professional judgments, the weights of the five dimensions have been determined using AHP.

Step 3: A SERVQUAL questionnaire is modified to measure the quality of the sanitation service according to the five criteria: tangibility, reliability, responsiveness, assurance, and empathy (Table 1). This step also determines the gap between expectations and perception. Using the weighted average perception score and multiplication of the weights, the OTSI is calculated.

Step 4: Using a multiple linear regression model (MLRM), the characteristics that affect the OTSI are determined based on tangibility, reliability, responsiveness, assurance, and empathy.

*2.2.3.1. Validity and reliability of the questionnaire using Chronbach's alpha.* The SPSS (version 22) was used to examine the data. Each item and variable received a unique code before the data was cleaned. Cronbach's alpha was calculated after the dependability was determined by a reliability test (Mahato et al., 2022). The value of Cronbach's alpha is shown in Table 2. Cronbach's alpha, measuring how closely linked a group of items is to one another, is vividly illustrated in Table 2 as a measure of internal consistency. For the independent variables, empathy has the lowest Cronbach's alpha at 0.811, while tangibility has the highest at 0.892. Every independent variable, however, has an adequate range of internal consistency, with none producing a result that is less than 0.7 (Saha & Paul, 2021). Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below, for conceptual purposes, we show the formula for the Cronbach's alpha (Equation 1):

$$\alpha = N \times c / [v + (N - 1) \times c] \tag{1}$$

**Table 1**
Reliability analysis using Cronbach's alpha for the selected indicators.

| Dimensions and indicators | | References | Chronbach's alpha |
|---|---|---|---|
| Tangibility | Interior are professionally designed and maintained ($T_1$) | Khurshid et al., 2012; Guiry et al., 2013; Asim et al., 2017; Ghose & Johann, 2018 | 0.892 |
| | | | 0.812 |
| | The lodge/ homestays surroundings are very appealing ($T_2$) | | 0.811 |
| | The hotels and homestays have windows, and are well-kept ($T_3$) | | 0.842 |
| | The front desk is deemed visually appealing ($T_4$) | | 0.890 |
| | The staff members have a highly orderly and tidy disposition ($T_5$) | | 0.891 |
| | The dining rooms are tastefully adorned and well-furnished ($T_6$) | | 0.877 |
| Reliability | The operators handle reservations in a responsible manner ($R_1$) | Khurshid et al., 2012; Gu & Page-Jarrett, 2018; Guiry et al., 2013; Asim et al., 2017 | 0.847 |
| | | | 0.842 |
| | The rooms are available when they are scheduled ($R_2$) | | 0.812 |
| | Warm bedding and a room heater are already present as promised ($R_3$) | | 0.811 |
| | Warm water for the restroom and the toilet do not require additional payment ($R_4$) | | 0.823 |
| Responsiveness | At the front desk, there is literature about hotels and other topics ($Rs_1$) | Guiry et al., 2013; Asim et al., 2017; Titu et al., 2016 | 0.822 |
| | | | 0.844 |
| | Employees respond to needs quickly ($Rs_2$) | | 0.824 |
| | When a service request is made, employees always endeavour to make the customer pleased ($Rs_3$) | | 0.827 |
| Assurance | Standard safety and hygienic practices are followed in bedrooms and bathrooms ($A_1$) | Khurshid et al., 2012; Guiry et al., 2013; Nahar, Islam, & Rahman, 2015; Ghose & Johann, 2018 | 0.842 |
| | | | 0.825 |
| | The lodging facility is very secure at night ($A_2$) | | 0.841 |
| | The personnel ares courteous to the visitors ($A_3$) | | 0.836 |
| | Food and beverages are delivered on schedule ($A_4$) | | 0.863 |
| Empathy | The right means of moving luggage inside the rooms has been used ($E_1$) | Khurshid et al., 2012; Guiry et al., 2013; Asim et al., 2017; Parasuraman et al., 1991 | 0.811 |
| | | | 0.855 |
| | Older and younger customers receive excellent service($E_2$) | | 0.845 |
| | The proper guidance and assistance are provided by the locals as well as guide ($E_3$) | | 0.832 |
| | Reservation rules and fees are made explicit ($E_4$) | | 0.863 |

here, $N$ is equal to the number of items, $c$ is the average inter-item covariance among the items and $v$ is equal to the average variance.

To ascertain if the items chosen for the questionnaire are measuring the intended construct or not, researchers frequently utilize Chronbach's alpha. In order to conduct research, items are typically chosen from prior literature (Saha & Paul, 2021). After receiving a small number of replies, Chronbach's alpha value is calculated to see if the items are in fact assessing the same and pertinent constructs. Excellent internal consistency is indicated by a Chronbach's alpha value greater than 0.9; good internal consistency is indicated by a value between 0.8 and 0.9; values greater than 0.7 and less than 0.8 are acceptable; values lower than 0.7 are not good. Therefore, the degree to which various items measure the same construct as true depends on a scale's Cronbach's alpha value. In this research, 21 questions, which have been found to be reliable utilising Chronbach's alpha, have value higher than 0.8.

*2.2.3.2. AHP application.* Saaty (1977) created AHP to make prioritization and decision-making easier. Currently, AHP is widely used in social science research, particularly in hazard and risk analysis. Several dangers have been taken into account and given weighting based on researchers' experience and local residents' perceptions in order to assess the multi-hazard risk zone. As the first stage of this technique, a pairwise matrix has been created among the scale of options on the offered alternatives (Fernández & Lutz, 2010). According to a nine-point judicial scale, a pairwise matrix's relationship is measured as follows: 1 = equal, 3 = moderate, 5 = strong, 7 = very strong and 9 = extremely strong. Values which lie in the intermediate are 2, 4, 6, and 8. The value range for the reversing scale is 1 to 1/9 (Baki, 2020; Saha, Haldar, Bhattacharya, & Paul, 2021). The scale of

**Table 2**
Rule of thumb for interpreting Cronbach's alpha for dichotomous questions (after Cronbach, 1951).

| Cronbach's alpha | Internal consistency |
|---|---|
| $\alpha \geq 0.9$ | Excellent |
| $0.9 > \alpha \geq 0.8$ | Good |
| $0.8 > \alpha \geq 0.7$ | Acceptable |
| $0.7 > \alpha \geq 0.6$ | Questionable |
| $0.6 > \alpha \geq 0.5$ | Poor |
| $0.5 < \alpha$ | Unacceptable |

**Table 3**
The scale of absolute number for measuring priorities in AHP.

| Intensity of importance | Definitions | Description |
|---|---|---|
| 1 | Equal importance | The purpose is equally supported by two activities |
| 3 | Moderate importance | One activity is marginally preferred over another by experience and judgment |
| 5 | Strong importance | Experience and judgment strongly favour one activity over another |
| 7 | Very strong importance | A extremely high preference for one activity over another is shown by the dominance of that activity in actual use |
| 9 | Extreme importance | The strongest possible order of affirmation exists for the data favoring one action over another |
| 2, 4, 6, 8 | Intermediate values | A sound supposition |
| Reciprocal of the above values | Values for inverse comparison | |

**Table 4**
Random inconsistency (RI) indices for $n = 1, 2, ..., 10$.

| $n$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| RI | 0 | 0 | 0.58 | 0.9 | 1.12 | 1.24 | 1.32 | 1.41 | 1.45 | 1.49 |

importance developed by Saaty (1977) is shown in Table 3. Further, the weight of each factor is calculated from row-multiplied value, calculating the unnormalized to normalized value. Here, AHP is required to determine the precise weighting through a pairwise matrix table because factors and responders appear to be unequal. When the consistency ratio (CR) has a value of 0.10 (CR≥ 0.10), AHP methods additionally provide the ability to assess the type of consistency of preferences provided by the report. For consistency ratio, we have to assess consistency index (CI) first using the following formula (Equations 2 and 3):

$$CI = (\lambda_{max} - n)/(n - 1) \tag{2}$$

$$CR = CI/RI \tag{3}$$

where, $\lambda_{max}$ represents the Eigen value of the pairwise comparison matrix, and RI is the random inconsistency index which depends on the number of assessment parameters ($n$). The variations of RI value for different number of parameters are shown in Table 4. In the present study, value of assessment parameters is 6 ($n$) when $\lambda_{max} = 6.556$, CI is 0.107 and CR at 0.091 has also been determined (Table 5).

*2.2.3.3. SERVQUAL model.* The terms "service" and "quality" are combined to form the phrase SERVQUAL. It is a well-known model in operational research developed by Parasuraman et al. (1985) that is used to gauge the quality of services provided by any enterprise by looking at the functional quality dimensions that show the gaps between the client and the service provider. Five Gaps (5Gs) in the service delivery process were identified by Parasuraman et al. (1985) in their study (Fig. 3). The following are the gaps that were found by them: (a) Gap 1 explains the knowledge gap between management perception and consumer expectations, (b) Gap 2 explains the design gap between management perception and service quality expectations, (c) Gap 3 explains the performance gap between service quality specification and service delivery, (d) Gap 4 explains the communication gap between service delivery and external communication to consumers, and (e) Gap 5 explains the expected service and the perceived service gaps. The SERVQUAL model (initially known as RATER model) addresses the discrepancy in expectations and perceptions between consumer and service provider (Fig. 3). The five dimensions of the SERVQUAL model for evaluating the service quality have been enumerated below:

**Table 5**
AHP pairwise matrix, weightage (Cp) and consistency measurement of the five dimensions based on the geometric mean of expert's opinion in the study area (computed by the authors using AHP).

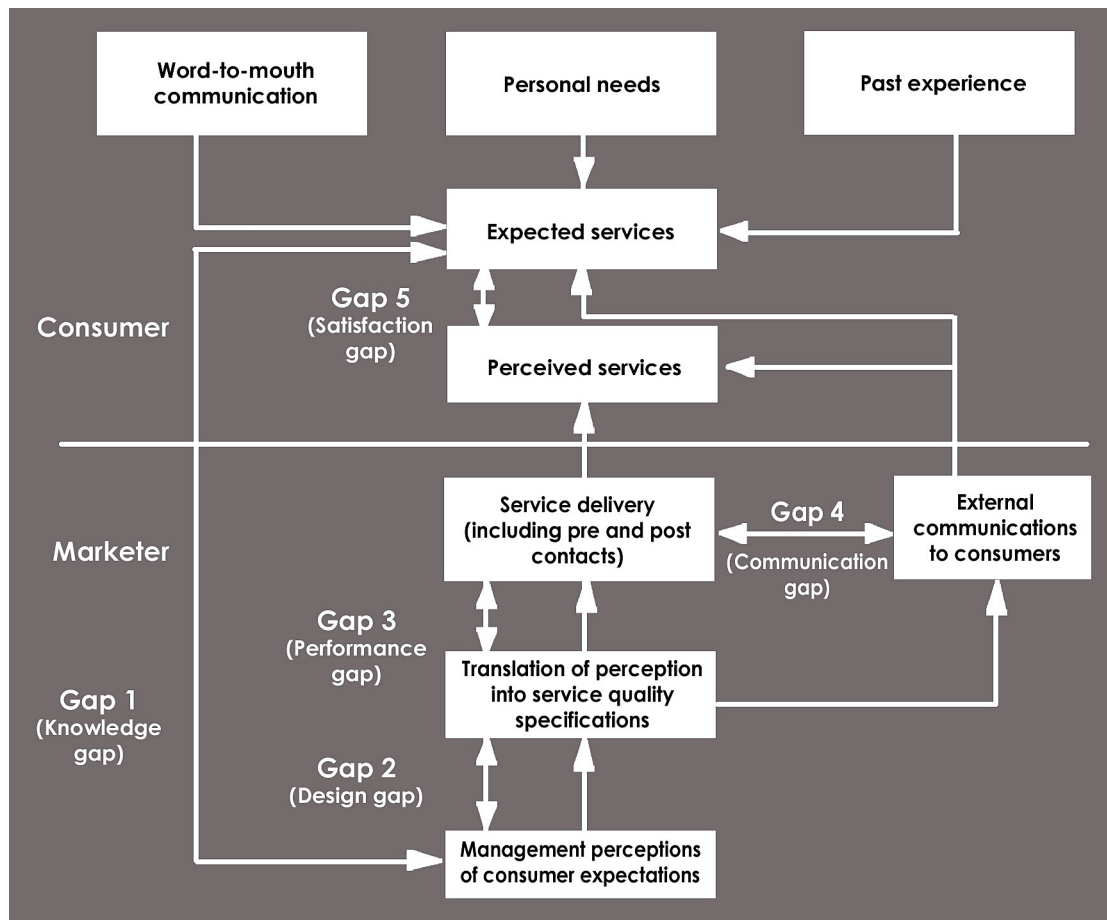| Dimensions | Tangibility | Reliability | Responsiveness | Assurance | Empathy | Cp | $\lambda_{max}$ | CI | CR |
|---|---|---|---|---|---|---|---|---|---|
| Tangibility | 1.00 | 2.21 | 0.93 | 0.58 | 2.38 | 0.12 | | | |
| Reliability | 0.45 | 1.00 | 1.11 | 0.58 | 1.28 | 0.29 | | | |
| Responsiveness | 1.07 | 0.90 | 1.00 | 1.19 | 0.41 | 0.19 | 6.556 | 0.107 | 0.091 |
| Assurance | 1.72 | 1.72 | 0.84 | 1.00 | 2.59 | 0.17 | | | |
| Empathy | 0.42 | 0.78 | 2.43 | 0.38 | 1.00 | 0.23 | | | |
| Total | 4.66 | 6.61 | 6.31 | 3.73 | 7.66 | 1.00 | | | |

**Fig. 3.** The gap model of service quality (adopted from Parasuraman et al., 1985).

Tangibility: The physical appearance of any service's buildings, apparatus, and workforce is referred to as "tangibility." In terms of tourism services, the aesthetic appeal of hotels' exteriors and interiors, surrounding environments, inviting front desks, staff members' cleanliness, and tastefully appointed dining rooms represent the tangible items.

Reliability: Reliability is the capacity to deliver the promised service consistently and correctly in a given setting. For tourism services, this entails making reservations responsibly, delivering the reserved rooms on time, providing warm bedding and a heater (room amenities), and providing warm water for the washroom as per requirement.

Responsiveness: Responsiveness is a measure of a service provider's willingness to assist clients and complete tasks quickly and efficiently. When it comes to tourism services, responsiveness is defined as being readily available at the front desk, responding quickly to customer requests, and consistently working to please customers.

Assurance: Assurance encompasses staff expertise, professionalism, courtesy, credibility, security, and their capacity to win over the faith and confidence of customers. The standard safety and hygienic procedures followed in bedrooms and washrooms, the secure lodging facility, the behaviour of the staff toward the guests, the scheduled delivery of food and beverages, etc. are all included in the tourism assurance service.

Empathy: Accessibility, communication, comprehension, care, and specialized attention are all examples of how a service provider exhibits empathy toward their clients. Moving bags inside the rooms, a caring approach toward the older and younger generations of guests, local aid and instructions, clear reservation procedures and prices, etc. are all examples of empathy in the tourism industry.

To evaluate the tourism services of Sandakphu Trail (in the Himalayan region) in West Bengal, India, a hybrid methodology employing the SERVQUAL and AHP models has been presented in this study article. The SERVQUAL technique, which includes the following steps, was used to survey 110 respondents (tourists and trekkers) in order to evaluate their opinions of the tourism services provided by the hotels and homestays along the Sandakphu Trail. The following are the steps used for the assessment:

i. The first step is to identify the concerns regarding the Sandakphu Trail (in the Himalayan region) tourism service quality in West Bengal, India. Following the use of Cronbach's alpha test for reliability testing, 21 modified questions regarding the quality of tourism services are developed based on the five aforementioned dimensions (Table 1), namely tangibility (6 questions), reliability (4 questions), responsiveness (3 questions), assurance (4 questions), and empathy (4 questions).

**Table 6**
Performance and level of satisfaction (after Ramez, 2012; Alam & Mondal, 2019).

| OTSI | Weighted gap score | Level of satisfaction |
|---|---|---|
| >75 | ≥ 0 | Highly Satisfied |
| 65–75 | −1–0 | Satisfied |
| 51–65 | −1––2 | Moderately Satisfied |
| 0–50 | ≤−2 | Unsatisfied |

ii. The respondents' linguistic evaluation of tourism facilities and ratings on expectation ($E$) and perception ($P$) for each attribute from the given statements were required in step two. The scale was from 1 to 5: Strongly disagree means 1, disagree means 2, fairly agree means 3, agree means 4, and strongly agree are 5. The results are based on respondents' opinions of the Sandakphu Trail's current tourism contributions and their expectations from the area under study. The expert opinions have been averaged for making weightage of each attribute and thus AHP pairwise matrix has been developed.

iii. The SERVQUAL gap score is determined by evaluating the difference between respondents' perceptions and expectations ($P$-$E$) of the tourism service offered along the Sandakphu Trail.

iv. For each of the aspects of the tourism service—reliability, responsiveness, assurance, empathy, and tangibility—the average SERVQUAL gap score is evaluated.

v. The average SERVQUAL gap score is computed by multiplying the weights of the five dimensions determined from the AHP pairwise comparison. This result is in the weighted SERVQUAL gap score.

vi. The weighted gap scores for each dimension of the Sandakphu Trail in West Bengal, India, are added up to determine the final weighted SERVQUAL gap score (Table 6) and the arithmetic mean value is further considered as OTSI.

OTSI calculates using the following equation:

$$\text{OTSI} = 100\frac{\sum |(I \times P)|}{G} \tag{4}$$

where $I$ is importance score, $P$ is perception, $G$ is gap score.

*2.2.3.4. Multiple regression analysis.* Because SPSS (version 22) is more user-friendly and best suited for analysing management-related attitudinal answers, regression analysis was carried out using this programme (Bickart, 1993; Njau et al., 2019) The significance level of the hypotheses was tested using multiple regressions (Wicks & Roethlein, 2009) Indicators of consumer satisfaction were regressed against the independent variables. The results of multiple regression analysis examine the relationship between customer satisfaction, service design, and service delivery.

The model of the regression equation model that was tested is shown in Equation 5:

$$Y = \beta_0 + \beta_1 T + \beta_2 R + \beta_3 \text{Rs} + \beta_4 A + \beta_5 E + \epsilon \tag{5}$$

where $Y$ is customer satisfaction; $\beta_0$ is constant term, $\beta_1$ is beta coefficient, $T$ is tangibility, $R$ is reliability, Rs is responsiveness, $A$ is assurance, $E$ is empathy; $\epsilon$ is error term (an amalgamation of other individual variations not specifically mentioned in the model).

## 3. Results and discussion

The study evaluated whether or not there was a statistically significant relationship between the age of visitors and their travel-related features using Pearson's Chi-squared test. At the 0.05 level, the test findings (see Table 7) revealed a significant correlation between age and travelling companion ($\chi^2 = 13.298$; $p = 0.018$). The results indicated that older male tourists (those over 50) were more likely to travel alone than younger tourists, while younger tourists (those under 50) were more likely to travel with friends than the older group. At the 0.001 level, there was a significant relationship between the age and mode of travelling ($\chi^2 = 12.987$; $p = 0.001$). The results indicated that senior visitors made up a bigger number of group tour participants, whereas young travelers made up a smaller proportion (Bickart, 1993). In the Sandakphu Trail, there was a significant relationship between age and lodging types at the 0.05 level ($\chi^2 = 11.875$; $p = 0.008$). This indicated that older tourists spent more time on the Sandakphu Trail than the younger travelers. The relationship between visitor's age and lodging was not statistically significant ($\chi^2 = 18.782$; $p = 0.287$). The results showed that there were younger visitors in comparison with hikers who were just regular tourists using cars. The tests revealed a substantial relationship between age and tourists' experiences while they were there, as well as recommendations for tourism management.

**Table 7**
Descriptive statistics showing sample characteristics.

| Travel characteristics | | Age | | | $\chi^2$ | p-value |
|---|---|---|---|---|---|---|
| | | <20 years old | 20–50 years old | >50 years old | | |
| Sex | Male | 8.90 | 38.50 | 22.20 | 11.982 | 0.008 |
| | Female | 7.30 | 21.20 | 1.90 | | |
| | Alone | 0.00 | 2.50 | 1.50 | | |
| Companion | Spouse/Partner | 1.50 | 20.20 | 12.60 | 13.298 | 0.018 |
| | Friend(s) | 11.80 | 33.50 | 8.50 | | |
| | Others | 2.90 | 3.50 | 1.50 | | |
| Mode of travelling | Individual | 5.50 | 15.50 | 2.50 | 12.987 | 0.001 |
| | Group tour | 10.70 | 44.20 | 21.60 | | |
| | Hotels | 12.50 | 25.80 | 18.60 | | |
| Accommodation | Homestays | 3.20 | 29.50 | 3.75 | 11.875 | 0.008 |
| | Others | 0.50 | 4.40 | 1.75 | | |
| Types of tourist | Trekkers | 2.50 | 35.50 | 2.50 | 18.782 | 0.287 |
| | Normal tourist | 13.70 | 24.20 | 21.60 | | |

## 3.1. Dimension-wise analysis

### 3.1.1. Tangibility

Unexpectedly, the SERVQUAL score on overall tangibility (Table 8) in the Sandakphu Trail is poor (−0.06). The Sandakphu Trail, which is renowned for its breathtaking and magnificent views of the five highest peaks in the world, may be the reason why tourists and trekkers have greater expectations from the hotels and homestays. An element-by-element analysis reveals that the Sandakphu Trail is exceeding tourists' and hikers' expectations for places that are professionally constructed and

**Table 8**
OTSI among the tourists/ trekkers based on expectations and perceptions in different study locations (halted for night stay purpose) at Sandakphu Trail.

| Study site | Dimensions | Weight | Expectations | Perception | Gap score | Weighted gap score | TSI | OTSI |
|---|---|---|---|---|---|---|---|---|
| Mane Bhanjang (n = 25) | Tangibility | 0.12 | 3.75 | 3.07 | −0.68 | −0.08 | 25.46 | |
| | Reliability | 0.29 | 3.48 | 3.35 | −0.14 | −0.04 | 51.91 | |
| | Responsiveness | 0.19 | 3.79 | 3.33 | −0.47 | −0.09 | 23.54 | 33.38 |
| | Assurance | 0.17 | 3.35 | 3.26 | −0.09 | −0.02 | 49.87 | |
| | Empathy | 0.23 | 3.69 | 3.23 | −0.46 | −0.11 | 16.13 | |
| | Σ | | 18.06 | 16.24 | −1.84 | −0.34 | | |
| Meghma (n = 15) | Tangibility | 0.12 | 3.58 | 3.51 | −0.08 | −0.01 | 56.13 | |
| | Reliability | 0.29 | 3.50 | 3.30 | −0.20 | −0.06 | 47.85 | |
| | Responsiveness | 0.19 | 3.67 | 3.50 | −0.17 | −0.03 | 39.90 | 42.53 |
| | Assurance | 0.17 | 3.50 | 3.71 | 0.21 | 0.04 | 29.70 | |
| | Empathy | 0.23 | 3.64 | 3.86 | 0.23 | 0.05 | 39.05 | |
| | Σ | | 17.89 | 17.88 | −0.01 | −0.01 | | |
| Tumbling (n = 20) | Tangibility | 0.12 | 3.71 | 3.88 | 0.17 | 0.02 | 28.19 | |
| | Reliability | 0.29 | 3.92 | 4.05 | 0.13 | 0.04 | 92.06 | |
| | Responsiveness | 0.19 | 4.19 | 3.99 | −0.20 | −0.04 | 37.91 | 67.23 |
| | Assurance | 0.17 | 4.01 | 3.80 | −0.21 | −0.04 | 30.40 | |
| | Empathy | 0.23 | 3.71 | 3.82 | 0.11 | 0.02 | 81.73 | |
| | Σ | | 19.54 | 19.54 | 0.00 | 0.00 | | |
| Gairibus (n = 15) | Tangibility | 0.12 | 3.50 | 3.39 | −0.12 | −0.01 | 34.83 | |
| | Reliability | 0.29 | 3.40 | 3.26 | −0.15 | −0.04 | 65.10 | |
| | Responsiveness | 0.19 | 3.69 | 3.52 | −0.17 | −0.03 | 39.30 | 42.14 |
| | Assurance | 0.17 | 3.41 | 3.68 | 0.26 | 0.04 | 23.80 | |
| | Empathy | 0.23 | 3.64 | 3.47 | −0.17 | −0.04 | 47.65 | |
| | Σ | | 17.64 | 17.32 | −0.35 | −0.08 | | |
| Kalpokhri (n = 10) | Tangibility | 0.12 | 3.68 | 3.74 | 0.07 | 0.01 | 67.35 | |
| | Reliability | 0.29 | 3.95 | 3.54 | −0.41 | −0.12 | 24.87 | |
| | Responsiveness | 0.19 | 4.20 | 3.67 | −0.53 | −0.10 | 13.06 | 44.70 |
| | Assurance | 0.17 | 3.89 | 3.76 | −0.13 | −0.02 | 50.13 | |
| | Empathy | 0.23 | 3.83 | 3.70 | −0.13 | −0.03 | 68.08 | |
| | Σ | | 19.55 | 18.41 | −1.13 | −0.26 | | |
| Sandakphu (n = 25) | Tangibility | 0.12 | 3.76 | 4.06 | 0.30 | 0.04 | 16.23 | |
| | Reliability | 0.29 | 3.76 | 3.89 | 0.13 | 0.04 | 88.48 | |
| | Responsiveness | 0.19 | 4.05 | 3.97 | −0.08 | −0.02 | 90.44 | 65.79 |
| | Assurance | 0.17 | 3.78 | 3.87 | 0.09 | 0.01 | 75.14 | |
| | Empathy | 0.23 | 3.68 | 3.83 | 0.15 | 0.03 | 58.65 | |
| | Σ | | 19.03 | 19.62 | 0.59 | 0.10 | | |
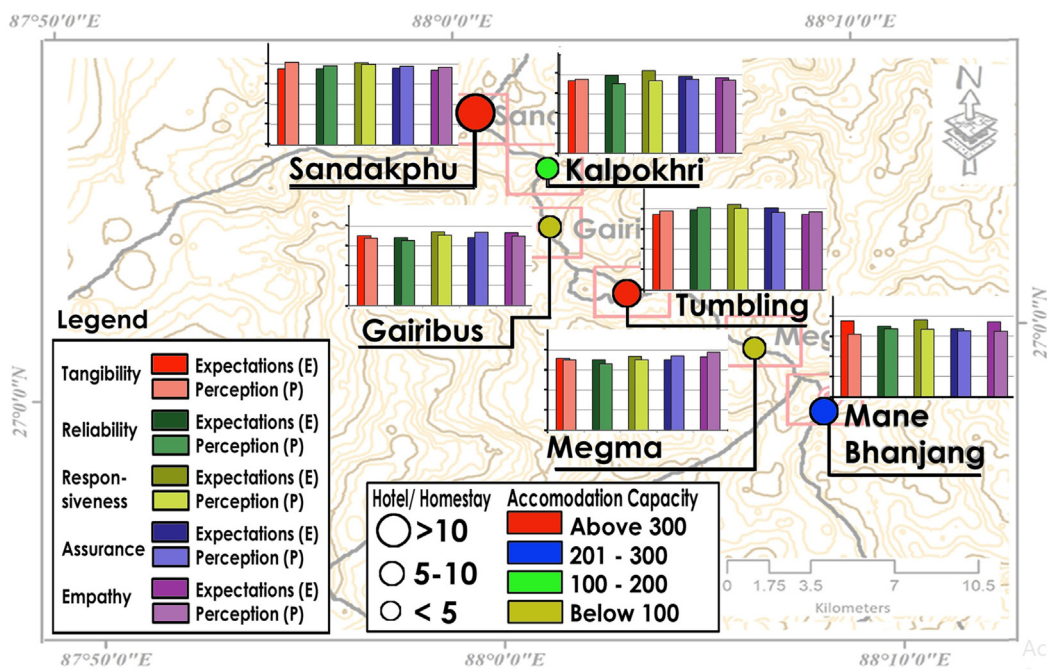
**Fig. 4.** Perception-satisfaction of SERVQUAL dimensions among the tourists and trekkers in Sandakphu Trail at Singalila National Park, Darjeeling, India.

maintained (0.36), and have exceptionally beautiful surroundings (0.31) and dining rooms that are tastefully decorated (0.13). However, the front desk's physical appearance (−0.95), the interior section with window facilities and the overall cleanliness (−0.31) of the location are all in dire need of improvement (Fig. 4). Mane Bhanjang (−0.08), Meghma (−0.01), and Gairibus (−0.01) exhibited the higher degree of the negative gap between expectation and perception, although Sandakphu (0.04) and Tumling (0.02) exceeded the expectations of travelers and trekkers (see Table 8).

### 3.1.2. Reliability

The results of the reliability dimension show a SERVQUAL score that is relatively low (0.11). Its element-by-element assessment indicates subpar service quality ratings. The operators handled reservations responsibly (−0.14), but positive feedbacks have been found in the rooms where existed a proper schedule of availability (0.17), followed by warm bedding and a room heater (0.08). The said dimension is relatively very poor at meeting the warm water demand for the restroom and the washroom (−0.54). Other night halt points, aside from Sandakphu (0.04) and Tumling (0.04) have become extremely faulty and unreliable when it comes to their performance (see Table 8).

### 3.1.3. Responsiveness

The responsiveness component has the largest degree of SERVQUAL score discrepancy (−0.27), according to the data in Table 8. Tourists expect the Sandakphu Trail to provide proper information about hotels and other related matters (−0.51), have personnel reply to their inquiries efficiently and swiftly (−0.24), and have sponsors ably act on the participant ideas (−0.06). Among the other locations, Kalpokhri (−0.10) and Mane Bhanjang (0.09) have the highest degree of gaps (Fig. 4).

### 3.1.4. Assurance

Table 8 makes it clear that the SERVQUAL score on assurance is decent (0.07), indicating that the Sandakphu Trail is just barely exceeding the expectations of its visitors and hikers. Its element-by-element examination provides a favorable rating for the use of safe and hygienic procedures in bathrooms and bedrooms (0.38). The aforementioned dimension is quite subpar when it comes to the food and drinks that were ordered and delivered on time (0.35). The other two factors, namely the lodging facility being extremely secure at night (0.17), and the visitors being attended to by qualified staff (0.08), somewhat exceeded what the visitors may have anticipated. Meghma (0.02) and Sandakphu (0.01) were in a better position than the other resting places along the Sandakphu path with respect to the expectations being met effectively and promptly (Fig. 4).

### 3.1.5. Empathy

The Sandakphu Phalut Trail's SERVQUAL score for overall empathy (Table 8) is subpar (−0.04). It is possible that tourists of different ages have higher expectations from the hotels and homestays because of the Sandakphu Trail, which is famed for its spectacular vistas of the five highest peaks in the world. Element-by-element research showed that the Sandakphu Trail is exceeding the hikers' and tourists' expectations for both the older and younger clients who have received top-notch services (0.27).

**Table 9**

Dimensions and indicators wise mean expectations, perceptions, gap and OTSI among the tourists/ trekkers in Sandakphu Trail.

| Dimensions and indicators | Expectations | Perception | Gap | OTSI |
|---|---|---|---|---|
| *Tangibility* | *4.21* | *2.90* | *−1.31* | *26.56* |
| Interior are professionally designed and maintained ($T_1$) | 3.29 | 3.66 | 0.36 | |
| The lodge/ homestays surroundings were very appealing ($T_2$) | 3.68 | 4.00 | 0.31 | |
| The hotels and homestays have windows are well-kept ($T_3$) | 4.13 | 3.82 | −0.31 | |
| The front desk was deemed visually appealing ($T_4$) | 3.94 | 3.00 | −0.95 | |
| The staff members had a highly orderly and tidy disposition ($T_5$) | 3.35 | 3.46 | 0.11 | |
| The dining rooms were tastefully adorned and well-furnished ($T_6$) | 3.59 | 3.72 | 0.13 | |
| *Reliability* | *4.24* | *3.04* | *−1.20* | *73.47* |
| The operators handled reservations in a responsible manner ($R_1$) | 3.69 | 3.55 | −0.14 | |
| The rooms were available when they were scheduled ($R_2$) | 3.40 | 3.57 | 0.17 | |
| Warm bedding and a room heater were already present as promised ($R_3$) | 3.68 | 3.76 | 0.08 | |
| Warm water for the restroom and the toilet does not require additional payment ($R_4$) | 3.91 | 3.37 | −0.54 | |
| *Responsiveness* | *3.82* | *2.70* | *−1.12* | *45.80* |
| At the front desk, there is literature about hotels and other topics (Rs$_1$) | 3.93 | 3.42 | −0.51 | |
| Employees respond quickly to needs (Rs$_2$) | 3.98 | 3.74 | −0.24 | |
| When a service request is made, employees always endeavour to make the customer pleased (Rs$_3$) | 3.89 | 3.83 | −0.06 | |
| *Assurance* | *4.07* | *2.86* | *−1.21* | *40.18* |
| Standard safety and hygienic practices are followed in bedrooms and bathrooms ($A_1$) | 3.50 | 3.88 | 0.38 | |
| The lodging facility was very secure at night ($A_2$) | 3.70 | 3.87 | 0.17 | |
| The personnel was courteous to the visitors ($A_3$) | 3.65 | 3.73 | 0.08 | |
| Food and beverages were delivered on schedule ($A_4$) | 3.70 | 3.34 | −0.35 | |
| *Empathy* | *3.75* | *2.96* | *−0.79* | *86.18* |
| The right means of moving luggage inside the rooms has been used ($E_1$) | 3.67 | 3.57 | −0.10 | |
| Older and younger customers received excellent service($E_2$) | 3.62 | 3.88 | 0.27 | |
| The proper guidance, assistance provided by the locals as well as guidance ($E_3$) | 3.93 | 3.81 | −0.11 | |
| Reservation rules and fees are made explicit ($E_4$) | 3.57 | 3.34 | −0.23 | |
| Mean | 4.02 | 2.89 | −1.13 | 58.19 |

*Note*: Mean is the average values of expectations, perceptions, gap for tangibility, reliability, responsiveness, assurance, and empathy. 58.19 was calculated with Equation 4.

However, there is a negative gap in the Sandakphu Trail due to the explicit reservation requirements and fees (−0.23), locals' advice and aid (−0.11), and transferring of bags inside the rooms (−0.10). Travelers' expectations were surpassed by Meghma (0.05), Sandakphu (0.04), and Tumbling (0.02) who displayed a higher degree of empathy (Fig. 4).

### 3.2. OTSI

This study uses a hybrid approach that integrates the SERVQUAL and AHP models to assess the difference between tourists' and trekkers' satisfaction based on the five factors of tourism service quality (Bhat, 2012). According to the results of the TSI and OTSI, the tourism service provided by the Sandakphu Trail in the Darjeeling hills falls between the "unsatisfied" and "satisfied" categories on the performance scale shown in Table 9, ranging from 33.38% to 67.23%. The aggregated gap score for each aspect of the tourism service ranges from −1.84 to 0.59, and the weighted gap score ranges from −0.347 to 0.1, indicating that there is a significant discrepancy between the expectations and perceptions of travelers and hikers with reference to the qualities of the tourism service in various locations, and it is very much in line with Salman, Kamerkar, Jaafar, and Mohamad (2022). The fact that the gap score and weighted gap score are negative indicates that the quality of the tourism services falls short of what the travelers and hikers on the Sandakphu Trail expect (Markovic & Raspor, 2010). The responsiveness gap is the largest, thus the travelers and trekkers are not satisfied with the way the hosts respond to their requests for tourism services. Contrarily, the assurance gap score is the smallest, indicating that the visitors and hikers on the Sandakphu Trail are generally satisfied with the assurance dimension of the trail (see Fig. 5). The combined expectation of the travelers, hikers, and industry professionals on the necessity of the dimension on tourism service quality is represented by the weighted gap score (Amin, Yahya, Ismayatim, Nasharuddin, & Kassim, 2013; Ramseook-Munhurrun, Naidoo, & Nundlall, 2010) The weighted gap score also demonstrates the need for the concerned authority to have an interest in enhancing the physical condition of the tourism facilities in order to boost service dependability and be inclusive of the enhancement of the Sandakphu Trail responsiveness (Saleh & Ryan, 1991). Even if the weighted gap score for the other characteristics is quite high, the Sandakphu Trail's tourist quality falls into the moderately satisfactory group (Shafiq et al., 2019). The evaluation of the visitors and trekkers during the survey at the various resting points clearly showed the range of satisfaction through the OTSI. Following Sandakphu, Tumling (67.23) successfully secured the first position under the "satisfied" category (65.79). However, some stations discovered that the expectation-perception notion was "unsatisfied" in nature (Table 9).
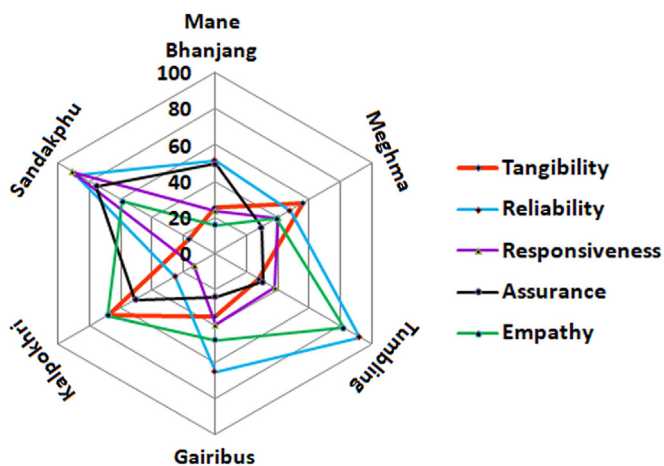
**Fig. 5.** OTSI based on SERVQUAL dimensions in Sandakphu Trail at Singalila National Park, Darjeeling, India

### 3.3. Factors associated with SERVQUAL

The significance level of the hypotheses has been tested using a MLRM. Indicators of visitor satisfaction were modeled on the independent variables (Saha et al., 2021). The results of multiple regression analysis examine the relationship between tourist satisfaction and service delivery by the host community (Njau et al., 2019). The outcome of the estimation for the MLRM has been shown in Table 10. The findings of the analysis showed that $R^2$ is 0.968. This means that about 96.8% of the variation in visitor satisfaction was accounted for by the tourist service quality variables in the service design. The satisfaction of tourists was 3.19% influenced by other factors. The research also showed that, when examined at a 95% confidence level, all the five dimensions were found to be significant (0.001). The model was revealed to be important (Nahar et al., 2015; Njau et al., 2019). To determine whether or not there was a significant association between service design and tourist satisfaction, and to test the significance of the regression model, the study used an analysis of variance (ANOVA). In the Sandakphu Trail, West Bengal, India, the null hypothesis ($H_0$:There is no significant relationship between the host service provision and tourist satisfaction of the hotels and homestays in the Sandakphu Trail, West Bengal, India) has been examined. The impact of the independent variables on the dependent variable-tourist satisfaction has been investigated.

When examined at a 95% confidence level, the probability test value of any variable indicating customer satisfaction that is less than 0.05 is considered significant and has an impact on the dependent variable, customer's expectation (Markovic & Raspor, 2010). Table 10 displays the outcomes. The model is statistically significant based on the analysis, where significance $F = 0.001$, which is less than $p = 0.05$, is indicated. This suggests that the model can be applied to make predictions. The Dublin-Watson indicator allows us to examine a hypothesis' statistical significance (Abedi et al., 2012). There would not be any serial correlation if the value is between 1.5 and 2.5 (Nahar et al., 2015). However, the serial correlation in this investigation is indicated by the value of 1.118. If we take the $F$ value into consideration, the model has found 20.972. The $F$ value will drop as the MLRM variables rise, while the adjusted $R^2$ value will rise (Saha et al., 2021).

The link and strength of the relationship between service design and tourist satisfaction were investigated by correlation analysis. The findings are shown in Table 11. Regression analysis revealed a positive relationship between service design and customer satisfaction on tangibility, with all the variables indicating positive coefficients as follows: Interior and exterior are professionally designed ($\beta = 0.125$), lodge/homestay surroundings ($\beta = 0.110$), dining rooms are tastefully decorated ($\beta = 0.103$), and staff members have a highly organised and tidy disposition ($\beta = 0.098$). Two of the reliability factors showed a positive correlation: dependability in warm bedding and a room heater being present as promised ($\beta = 0.125$), reliability in rooms being available when booked ($\beta = 0.115$); two of the reliability factors showed a negative correlation: reliability of operators in handling the reservations responsibly ($\beta = -0.139$), reliability in warm water for the restroom and the washroom not requiring additional payment ($\beta = -0.201$). The study's findings showed that just two of the four reliability variables—warm bedding and a room heater—had significant values, with $p$ values of $0.000 < 0.05$. This demonstrated that the other two factors had no statistical significance, which further indicated the impact of the realization of ensured service on tourist satisfaction. Additionally, the

**Table 10**
Model summary for MLRM.

| Model | $R$ | $R^2$ | Adjusted $R^2$ | Std. error of the estimate | Durbin-Watson | $F$ | Sig. |
|-------|-----|-------|----------------|----------------------------|---------------|-----|------|
| 1 | 0.991[a] | 0.968 | 0.928 | 0.4128 | 1.118 | 20.972 | 0.001 |

a. Predictors: (constant), VAR0002, VAR00003, VAR00004, VAR0005, VAR00006.
b. Dependent variable: $y$ (TOSI).

**Table 11**
Determinants of tourism satisfaction in Sandakphu Trail derived by MLRM.

| Dimensions | Indicators | Unstandardized coefficients | | Standardized variables coefficients | $t$ | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. error | Beta | | |
| | Intercept | 0.236 | 0.6271 | | 0.421 | 0.687 |
| | $T_1$ | 0.125 | 0.2135 | 0.112 | −1.587 | 0.001** |
| | $T_2$ | 0.110 | 0.0021 | 0.078 | 0.972 | 0.029 |
| Tangibility | $T_3$ | −0.145 | 0.0081 | 0.002 | −0.240 | 0.037 |
| | $T_4$ | −0.201 | 0.0031 | 0.005 | 1.882 | 0.011 |
| | $T_5$ | 0.098 | 0.0045 | 0.009 | −1.321 | 0.023 |
| | $T_6$ | 0.103 | 0.0183 | 0.087 | 0.742 | 0.002* |
| | $R_1$ | −0.139 | 0.1532 | 0.087 | −1.571 | 0.035 |
| Reliability | $R_2$ | 0.115 | 0.1735 | 0.092 | −1.417 | 0.008 |
| | $R_3$ | 0.125 | 0.1815 | 0.087 | −1.324 | 0.000** |
| | $R_4$ | −0.201 | 0.0031 | 0.005 | 1.742 | 0.045 |
| | $Rs_1$ | −0.231 | 0.1821 | 0.081 | −1.352 | 0.009 |
| Responsiveness | $Rs_2$ | 0.221 | 0.1587 | 0.092 | −1.217 | 0.000** |
| | $Rs_3$ | −0.101 | 0.0087 | 0.025 | 1.711 | 0.085 |
| | $A_1$ | 0.117 | 0.3124 | 0.112 | −1.387 | 0.000** |
| Assurance | $A_2$ | 0.119 | 0.1915 | 0.087 | −1.412 | 0.001* |
| | $A_3$ | −0.109 | 0.0031 | 0.005 | 1.982 | 0.017 |
| | $A_4$ | −0.301 | 0.0131 | 0.004 | 1.622 | 0.032 |
| | $E_1$ | −0.201 | 0.0031 | 0.005 | 1.742 | 0.045 |
| Empathy | $E_2$ | 0.119 | 0.1915 | 0.087 | −1.412 | 0.001* |
| | $E_3$ | −0.101 | 0.0087 | 0.025 | 1.711 | 0.085 |
| | $E_4$ | −0.101 | 0.0087 | 0.025 | 1.711 | 0.085 |

*Note*: *denotes significance at 0.01, and ** denotes significance at 0.05, respectively.

relationship was negative, denoting customer dissatisfaction. Responsiveness of the front desk and the fact that there is literature on the hotels and other associated matters ($\beta = −0.231$), and the employees always trying to make the customers happy ($\beta = −0.101$) revealed unfavorable associations, but the employees' responsiveness to the needs indicated very strong relationships ($\beta = 0.221$), having a higher significance of $p = 0.000 < 0.01$.

A weak positive association between service design and tourist satisfaction was indicated by assurance's low coefficients. The coefficients were: assurance for safety and hygienic practices followed in bedrooms and bathrooms ($\beta = 0.087$), the lodging facility being very secure at night found ($\beta = 0.098$), emphasizing a positive correlation; assurance in personnel being courteous to the tourists ($\beta = −0.0109$), and the food and beverages being delivered as per the schedule ($\beta = −0.309$), focusing on a negative correlation. Only one indicator of the results on empathy showed a positive correlation; understanding that both the older and younger customers experienced top-graded service. Three other variables, however, indicated a negative correlation: empathy in the use of correct methods for moving luggage inside the room ($\beta = −0.201$), proper local assistance ($\beta = −0.101$), and explicit disclosure of reservation terms and prices ($\beta = −0.098$). Only the indicators putting emphasis on empathy in the older and younger clients receiving good service, had significant findings, according to the significance test ($p = 0.001 < 0.01$). The other factors affecting empathy were not noteworthy.

## 4. Planning implications for future research

One of the key services that must be offered to visitors at a place in a sustainable way is tourism. The fundamental concept of participatory tourism development and planning combines the public's perception of their needs with professional judgment (Gaffar & Kumar, 2021; Yang, 2022). In order to assess the caliber of a service offered along the Sandakphu Trail, this research presented a hybrid technique that combines the perception and expectations of tourists and hikers with professional judgment regarding the relative importance of each criterion. Following the adoption of Association of Southeast Asian Nations (ASEAN) standards for homestays, the Himalayan region's tourism planning is now inclusion-focused, ensuring equal services in tourist destinations which is given more consideration to maintain sustainability and inclusiveness (Alam & Mondal, 2019). In an equal measure, tangibility, reliability, responsiveness, assurance, and empathy are the services that must be made available in the tourism sector. To provide tourism services to the Sandakphu Trail's resting sites, a baseline survey of service provision, need and demand assessment, and a detailed survey are all necessary (Gaffar & Kumar, 2021). In this work, a methodology for measuring tourism satisfaction was suggested. Using this methodology, we were able to measure tourism satisfaction on the service qualities of the Sandakphu Trail without the need for any quantitative data (Gholami et al., 2016). Based on the OTSI value, it is simple to decide on tourism planning initiatives for the Sandakphu Trail in Darjeeling, India, as this method reveals a dimension-wise gap in the quality of tourism services (Ghose & Johann, 2018). Some of the most significant tourism planning initiatives needs to be implemented if the quality of tourism services in Darjeeling's Sandakphu Trail is to be improved. The planning strategies for sustainable tourism are listed below:

a. The weighted gap score for each dimension is computed in this study by combining the tourist expectation gap from the SERVQUAL model and the expert's judgment from the AHP model. The weighted gap score demonstrates that the quality of the tourism service is unreliable because the dependability gap score varies greatly between halting stations. Therefore, the concerned authorities should give the Sandakphu Trail's physical condition its full attention. Table 8 shows that the hotel and homestay authorities should prioritize the task by assessing the gap score to maximize the use of resources and time since tangibility, reliability, and responsiveness could not satisfy the expectations of visitors and trekkers.

b. The responsiveness dimension is the most significant one that is in worse shape according to the weighted gap score. Table 8 shows that despite a lack of hotel-related literature at the front desk and among the staff, services connected to responsiveness are provided rapidly. Authorities for hotels and homestays should offer specialist tourism services for the aforementioned problems along the Sandakphu Trail.

c. The concerned authorities should put stress on their actions based on the average gap score presented in Table 8 since the weighted gap scores for reliability, tangibility, and empathy are quite similar.

d. This study was conducted on the Darjeeling region's Sandakphu Trail, which is not entirely indicative of the state of mountain tourism in the Darjeeling Himalayas. This hybrid approach can be used to identify the tourism demands in a much better way and accordingly plan the initiatives in other mountain tourism areas.

In the Himalayan landscape, which is essentially a trekker's paradise, the study focuses on expectations and perceptions of the tourism service. The study has some limitations even though the authors used a variety of statistical metrics. First, due to the fact that it is based on empirical findings, various unrelated aspects of the environment, such as the climate, local risks (such as landslides and soil erosion), the effects of COVID-19, and state intervention in the site's development, are not taken into consideration. Second, the cross-sectional design of our study allowed us to gauge how respondents saw their commitments at a particular moment. Last but not least, due to the study's limited sample size and potential for generalization, the findings may not be fully applicable.

## 5. Conclusion and recommendation

In the context of the hospitality and tourism management, the gap theory and the notion of service quality have been reground. The four interpretable service quality elements for tourism services were discovered through empirical testing of a modified SERVQUAL instrument: tangibility, reliability, responsiveness, assurance and empathy. The conclusion makes sense in light of Bhat (2012) contention that the model's dimensions may alter depending on the service sector under research. The outcome is the result of numerous variations in the study's physical settings (basically topographical variances). This study uses SERVQUAL and AHP, two effective tools for stakeholder analysis in the mountainous terrain, to gauge how satisfied the Sandakphu Trail visitors are with the caliber and competence of the tourism services. Five dimensions were determined in this particular study, primarily due to the various service contexts. The current analysis supports the recommendations made by Crompton, Mackay, and Fesenmaier (1991) and Bhat (2012) that future studies should take into account the context of various service industries. The main flaw in the current study, however, is that the survey's time period and location-specific factors may have an impact on how well the services are analysed. As a result, any future research must use the information procured and produced from the local data with extreme caution. However, this study offers a theoretical and empirical insight into the tourism services and the tourism industry as a whole.

The general standard of the tourism services offered by the Sandakphu Trail to its visitors ranged from "unsatisfied" to "satisfied". A greater SERVQUAL gap score ($-1.13$) make it very evident that the tourism services fall short of the visitors' expectations. To improve the overall quality of the tourism services, the management and advisors must pay attention to the tangibility, reliability, and assurance (dimensions of tourism services), where the SERVQUAL scores are generally extremely low. Administering and executing the perceived service quality require tourism service providers to align the perceived and expected levels of service in order to satisfy the tourists. The promises made concerning how the service will operate through traditional marketing activities, and word of mouth communication must not be unrealistic when compared to the service that the tourists will eventually receive in order to keep the gap between the expected service and the perceived service as small as possible. This methodology can be used to evaluate the quality of a wide range of services offered at any spatial scale.

## Ethical statement

Ethical approval for this study was waived by the institutional review board of Sidho-Kanho-Birsha University University, because there are no sensitive data included in the interview and questionnaire. The participants provided their written informed consent for the publication of their de-identified information in this article. A sample informed consent form is included in the supplemental sheet.

## CRediT authorship contribution statement

**Payel Bhattacharya:** Methodology, Formal analysis, Writing – original draft, Writing – review editing. **Adrika Mukhopadhyay:** Formal analysis, Software, Writing – original draft. **Bhaskar Samanta:** Writing – review editing. **Manas Mondal:** Writing – review

editing. **Jayanta Saha:** Writing – review editing. **Subhasis Bhattacharya:** Methodology, Formal analysis, Investigation, Software, Writing – original draft. **Suman Paul:** Methodology, Formal analysis, Investigation, Software, Writing – original draft.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ijgeop.2023.04.001.

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