International Review of Management and Marketing

ISSN: 2146-4405

available at http: www.econjournals.com

International Review of Management and Marketing, 2026, 16(1), 313-324.

Tourism and Referral Healthcare System Efficiency the Role of Sustainability and Socio-Cultural Factors in Uttar Pradesh

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Received: 19 June 2025 **Accepted:** 08 October 2025 **DOI:** https://doi.org/10.32479/irmm.21381

ABSTRACT

Medical tourism has become a rapidly expanding sector that intersects healthcare and hospitality, enabling patients to travel across borders for specialized, high-quality, and cost-effective treatments. In India, Uttar Pradesh is emerging as a competitive medical tourism destination, supported by its expanding network of tertiary and referral healthcare facilities. This study investigates the influence of medical tourism, sustainability practices, socio-cultural factors, and infrastructure and operational capacity on the efficiency of referral healthcare systems in the state. A quantitative, cross-sectional research design was employed, using a structured questionnaire administered to 372 patients and caregivers who had accessed referral services within the past 12 months. Data were analyzed using structural equation modeling (SmartPLS 4). The results reveal that infrastructure and operational factors, medical tourism, and socio-cultural factors have significant positive effects on referral healthcare system efficiency, while sustainability practices show a positive but statistically insignificant relationship. The findings extend the literature by integrating healthcare operations, hospitality management, and socio-cultural competence into a unified analytical framework. Managerial and policy implications include prioritizing infrastructure enhancement, institutionalizing cultural competence training, and embedding operational improvements into medical tourism strategies. The study also highlights the need for more systematic integration of sustainability practices into hospital operations to translate long-term ethical commitments into measurable operational outcomes.

Keywords: Medical Tourism, Referral Healthcare System Efficiency, Sustainability Practices, Hospitality Management, Healthcare Operations, Destination Competitiveness
JEL Classification: I15, I18, L83, Q01, Z13, H51

1. INTRODUCTION

Medical tourism has become one of the fastest-growing sectors at the intersection of healthcare and hospitality management, enabling patients to travel across borders to access specialized, cost-effective, and high-quality medical treatment (Leggat, 2015). Globally, the industry is valued in billions of dollars and continues to expand, driven by rising healthcare costs in developed economies, greater accessibility of international travel, and heightened patient awareness of treatment options worldwide (Kim et al., 2019). For destinations, medical tourism offers not only direct healthcare revenue but also spillover benefits for related sectors such as accommodation, transport, and local services (Campra et al., 2022).

India stands among the leading global destinations for medical tourism, attracting patients from neighbouring South Asian countries, Africa, the Middle East, and increasingly from Europe and North America (Medhekar and Wong, 2020). The country's competitive advantage lies in its combination of skilled healthcare professionals, advanced medical technologies, English-speaking staff, and relatively low treatment costs compared to Western

nations. Government initiatives to promote India as a healthcare destination have further strengthened this position. According to the Ministry of Tourism, the Indian medical tourism sector is projected to surpass USD 13 billion by 2026, with both international and domestic patient flows contributing to this growth (Arulmozhi et al., 2019).

Within India, Uttar Pradesh presents a distinctive case. Traditionally recognized for its cultural heritage and religious tourism, the state has recently emerged as a growing hub for tertiary and referral healthcare services. Urban centers such as Lucknow, Noida, Varanasi, and Kanpur now host a mix of government and private hospitals offering specialized treatments that attract not only local patients but also domestic medical tourists from states such as Bihar, Madhya Pradesh, Rajasthan, and Delhi NCR, as well as international patients from Nepal, Bangladesh, Bhutan, and several African countries (Medhekar and Wong, 2020). This combination of healthcare delivery and tourism-related service provision positions Uttar Pradesh as a developing player in the broader medical tourism landscape.

The referral healthcare system plays a pivotal role in this environment. For local and non-local patients alike, the efficiency with which referrals are managed determines timely access to specialized treatment, continuity of care, and overall patient satisfaction (Cao et al., 2024). For medical tourists, referral pathways often extend beyond clinical considerations to encompass travel arrangements, visa facilitation, interpreter services, and post-treatment accommodation, thereby linking the process closely to hospitality management principles. In effect, the referral process becomes part of the medical tourist's overall service journey, where operational efficiency and service quality jointly shape the patient experience (Alkinaidri et al., 2018).

Efficient referral systems are characterized by smooth inter-hospital coordination, timely transfers, reliable information exchange, and well-managed transportation logistics. In the context of medical tourism, inefficiencies in these processes can have amplified consequences, potentially leading to dissatisfaction, reputational damage, and loss of competitive advantage for the destination (Wang et al., 2021). From a hospitality operations perspective, the referral network functions much like a service supply chain in tourism, in which each stage — from initial contact to arrival at the treatment facility — must be carefully managed to maintain service continuity and customer trust (Aboelkhir et al., 2022).

Sustainability practices have become a critical strategic consideration in tourism and hospitality and are increasingly relevant to healthcare services catering to medical tourists (Soeripto, 2019). In referral healthcare, sustainability encompasses environmental stewardship, economic viability, and social responsibility. Environmentally, hospitals may implement waste management systems, energy-efficient technologies, and water conservation measures. Economically, sustainable resource management supports long-term operational stability and cost efficiency (Xu et al., 2023). Socially, initiatives such as community health programs and equitable access to services foster trust and enhance the reputation of healthcare providers. For medical tourists, visible commitment to sustainability can signal service quality, ethical responsibility, and alignment with global expectations for responsible travel. In Uttar Pradesh, sustainability adoption varies widely, with some private hospitals integrating environmental and social initiatives into their operations, while public facilities may face infrastructural and budgetary constraints (Rastog, 2018). Understanding how sustainability interacts with referral efficiency can inform strategies to improve both patient outcomes and destination appeal (Ebrahim and Ganguli, 2019).

Socio-cultural factors are another essential dimension of referral healthcare efficiency, particularly in settings that serve diverse patient populations (Malhotra and Dave, 2022). Cultural beliefs, language preferences, religious practices, and dietary customs influence how patients perceive healthcare services and interact with providers (Moghavvemi et al., 2017). In medical tourism, socio-cultural competence is comparable to cross-cultural service skills in hospitality, where understanding and respecting diverse customer needs is key to service success (Zakaria et al., 2023). In Uttar Pradesh, domestic medical tourists may speak different languages and hold varied expectations for treatment, while international patients may require interpreters, culturally appropriate meals, and accommodation for religious observances. Hospitals that address these needs effectively are more likely to deliver a referral experience that is perceived as efficient, comfortable, and trustworthy (Agarwal et al., 2020).

Although there is a substantial body of literature on medical tourism and healthcare service quality, few studies have examined the role of referral healthcare system efficiency as a determinant of competitiveness in medical tourism. Even fewer have integrated sustainability and socio-cultural dimensions into this relationship, especially in emerging destinations such as Uttar Pradesh. Much of the existing research on medical tourism focuses on marketing or clinical service aspects, while studies on sustainability in healthcare often center on environmental outcomes without connecting these to patient-centered operational efficiency. Similarly, research on socio-cultural factors in healthcare tends to address general patient satisfaction but rarely in the context of cross-border medical travel and referral pathways.

This study addresses these gaps by examining how medical tourism, sustainability practices, and socio-cultural factors collectively influence the efficiency of referral healthcare systems in Uttar Pradesh. By integrating perspectives from healthcare operations, hospitality management, and destination marketing, the research seeks to provide both theoretical and practical insights. The findings are expected to inform strategies that improve operational performance, enhance patient experiences, and strengthen the competitive positioning of Uttar Pradesh in the global medical tourism market. This aligns closely with the International Journal of Contemporary Hospitality Management's focus on applied research with clear implications for strategic management, operations, marketing, and service innovation within the hospitality and tourism sectors.

2. REVIEW OF LITERATURE AND HYPOTHESIS DEVELOPMENT

2.1. Medical Tourism (MT) and Referral Healthcare System Efficiency (RH)

Medical tourism has emerged as a global healthcare phenomenon where patients cross domestic or international boundaries to access medical services, often motivated by affordability, quality, availability, and specialized care (Thakur, 2018). For regions like Uttar Pradesh, the influx of domestic and foreign medical tourists creates both opportunities and pressures for referral healthcare systems. Well-structured referral pathways can ensure timely access to specialized care for medical tourists, reduce overcrowding at tertiary facilities, and improve resource allocation (Sarojini et al., 2011). Conversely, inefficient referral processes can lead to delays, patient dissatisfaction, and negative word-of-mouth, ultimately affecting the reputation of a destination hospital (Perkumiene et al., 2019). Literature suggests that hospitals that align their referral mechanisms with the expectations of medical tourists achieve higher operational efficiency and patient loyalty (Handayani et al., 2021).

H_1: Medical tourism has a positive and significant effect on referral healthcare system efficiency.

2.2. Sustainability Practices (SP) and Referral Healthcare System Efficiency (RH)

Sustainability in healthcare refers to the integration of environmentally responsible practices, efficient resource utilization, and socially equitable service delivery (Al Janabi, 2023). In referral hospitals, sustainability practices may include waste management, energy-efficient infrastructure, water conservation, and the use of green technologies (Agarwal et al., 2020). From a systems perspective, sustainable practices reduce operational costs, extend facility life cycles, and contribute to a healthier patient environment, thereby indirectly improving service efficiency (Give et al., 2019). Furthermore, hospitals perceived as environmentally responsible often enjoy greater public trust and stronger patient engagement (Ameyaw et al., 2020). The literature shows that sustainability is not merely a corporate social responsibility goal but a driver of long-term operational excellence in healthcare referral systems (Nyawira et al., 2022).

H_2: Sustainability practices have a positive and significant effect on referral healthcare system efficiency.

2.3. Socio-Cultural Factors (SC) and Referral Healthcare System Efficiency (RH)

Socio-cultural factors, including language, religious beliefs, dietary preferences, and community norms, significantly influence patient perceptions, healthcare-seeking behaviours, and compliance with referral advice (Jumbam et al., 2020). In multicultural and multiethnic contexts, such as Uttar Pradesh, hospitals that effectively integrate socio-cultural sensitivity into their referral systems can reduce communication gaps, improve patient trust, and enhance adherence to treatment pathways (Ofosu et al., 2021). Studies indicate that socio-cultural alignment in service delivery can minimize patient dropouts between referral stages and improve overall system throughput (Diba et al., 2019). These factors are particularly crucial in regions with high inbound patient mobility, where cultural congruence directly affects service satisfaction and system efficiency (Chen and Wu, 2022).

H_3: Socio-cultural factors have a positive and significant effect on referral healthcare system efficiency.

2.4. Institutional Outcomes (IO) and Referral Healthcare System Efficiency (RH)

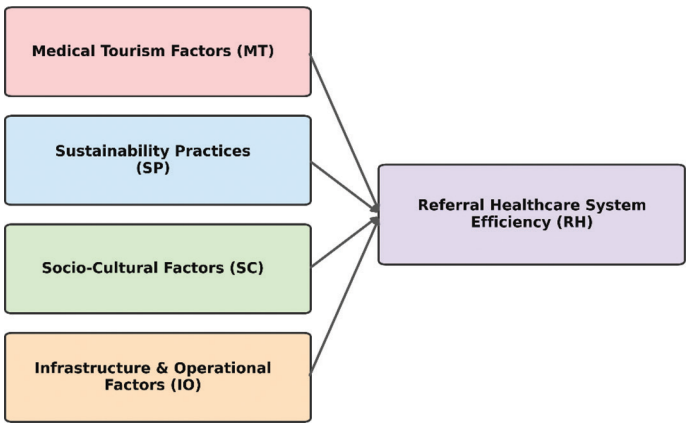
Institutional outcomes encompass measurable results such as patient recovery rates, readmission rates, mortality rates, and institutional reputation (Bies and Zacharia, 2007). Efficient referral systems contribute to better institutional outcomes by ensuring appropriate patient triage, optimal utilization of resources, and timely delivery of care (Sen Gupta, 2008). Positive institutional outcomes, in turn, reinforce system efficiency through improved trust, staff morale, and higher patient volumes (Smith et al., 2011). Prior research demonstrates that hospitals achieving superior institutional outcomes are more likely to sustain high levels of operational efficiency in referral networks (Chaudhury et al., 2005).

H_4: Institutional outcomes have a positive and significant effect on referral healthcare system efficiency.

The above constructs collectively contribute to the efficiency of referral healthcare systems by enhancing resource availability, improving patient satisfaction, and streamlining service delivery. In the case of Uttar Pradesh, the interplay between medical tourism, sustainability practices, socio-cultural alignment, and institutional outcomes is particularly significant, given the state's role as both a healthcare hub and a referral network node for surrounding regions.

The conceptual model developed for this study integrates these factors into a unified framework, illustrating the hypothesized relationships between the independent variables (medical tourism, sustainability practices, socio-cultural factors, institutional outcomes) and the dependent variable (referral healthcare system efficiency). This model is presented in Figure 1.

Figure 1: Conceptual model of determinants influencing referral healthcare system efficiency



3. RESEARCH METHODOLOGY

The present study adopted a quantitative, cross-sectional research design to empirically examine the proposed conceptual model investigating the influence of medical tourism, sustainability practices, socio-cultural factors, and institutional outcomes on the efficiency of referral healthcare systems in Uttar Pradesh, India. A structured, self-administered questionnaire was developed based on validated scales from prior studies and adapted to the specific context of referral healthcare in the region. All items were measured on a five-point Likert scale ranging from 1 ("Strongly Disagree") to 7 ("Strongly Agree"), enabling respondents to express the intensity of their perceptions. A pre-test involving 40 respondents was conducted to ensure clarity, content validity, and reliability, leading to minor refinements in wording.

The study targeted patients and caregivers who had accessed referral healthcare services in Uttar Pradesh within the past 12 months. This ensured that participants had recent and relevant experiences to draw upon. The sampling frame included major referral hospitals across both urban and semi-urban areas, as well as tertiary facilities that regularly receive patients from rural regions. A purposive sampling technique was used, with inclusion criteria specifying that respondents must be at least 18 years of age, have personal experience with referral-based healthcare services in the state, and be willing to participate voluntarily.

Data collection took place between April 2024 and March 2025 in multiple cities representing diverse referral hubs, including Lucknow, Varanasi, Kanpur, Agra, Prayagraj, and Gorakhpur. These locations were selected for their significant patient inflows, including both domestic and medical tourism cases. Questionnaires were distributed in two modes: on-site at outpatient departments and waiting areas, in coordination with hospital administration, and online through patient advocacy groups, hospital social media pages, and WhatsApp communities. Participants were given an overview of the study's purpose and assurances of anonymity before completing the survey.

Following the guidelines for structural equation modeling that recommend a minimum of 10 respondents per estimated parameter, and considering the 30 measurement items in the model, a minimum of 300 responses was required. To increase statistical power and account for potential non-responses, 450 questionnaires were distributed. A total of 386 were returned, of which 372 were complete and usable, yielding a valid response rate of 82.6%. This high response rate was facilitated by the researcher's direct presence during on-site collection, timely follow-up reminders for online participants, and support from hospital staff.

The instrument used for this study was developed through a structured process of item and construct development. The questionnaire comprised five primary constructs—medical tourism, sustainability practices, socio-cultural factors, institutional outcomes, and referral healthcare system efficiency—each measured through multiple items adapted from established frameworks and prior research. The item pool was refined through content validation to ensure clarity, relevance, and alignment with the study objectives. Table 1 presents the detailed constructs, their measurement items, and the original sources from which they were adapted. Reliability testing confirmed that all constructs achieved Cronbach's alpha values exceeding 0.70, indicating strong internal consistency.

Ethical considerations were observed by ensuring voluntary participation, maintaining confidentiality, and using the data solely for academic research purposes. No personal identifiers were collected, and participation did not involve any physical, psychological, or social risk. The study adhered to established ethical research principles, with all respondents providing informed consent prior to participation.

Data analysis was carried out in two stages. First, SPSS version 26 was used to conduct descriptive statistics, check data normality, and assess reliability. Second, structural equation modeling (SEM) using SMART-PLS version 24 was employed to test the hypothesized relationships within the conceptual model. Before hypothesis testing, checks were conducted for multicollinearity to ensure the robustness of findings.

4. DATA ANALYSIS AND RESULTS

Table 2 displays that the respondents represented a wide range of age groups, with the highest proportion falling in the 18-25 years category (22.8%), followed by 36-45 years (16.4%), 56-65 years (16.1%), and 46-55 years (15.9%). Smaller proportions were observed among those aged 26-35 years (13.4%), above 65 years (9.7%), and below 18 years (5.6%). In terms of gender distribution, females comprised the majority (59.7%), while males accounted for 40.3% of the sample. Regarding place of residence, nearly half of the respondents (47.8%) were from other states in India, 43.0% resided in rural areas within Uttar Pradesh, and only 9.1% were from urban areas within the state. The primary reasons for referral varied, with emergencies or critical conditions requiring higher care being the most frequent (33.9%), followed by patient choice or preference (32.5%), insurance or financial considerations (17.2%), lack of equipment or facilities at the initial hospital (10.5%), and the need for specialized treatment or expertise (5.9%). In terms of transportation to referral hospitals, the majority (78.5%) arrived by ambulance, while others used public transport (12.1%) or private vehicles (9.4%).

Table 3 displays the construct loadings, composite reliability (CR), average variance extracted (AVE), Cronbach's alpha, and variance inflation factor (VIF) for all measurement items used in the study. The results indicate that all constructs met the recommended reliability and validity thresholds suggested by (Hair, 2021). Specifically, the composite reliability values for Medical Tourism Factors (0.919), Sustainability Practices (0.877), Socio-Cultural Factors (0.904), Infrastructure and Operational Factors (0.916), and Referral Healthcare System Efficiency (0.897) exceeded the minimum benchmark of 0.70, demonstrating strong internal consistency. The AVE values ranged from 0.522 to 0.674, surpassing the 0.50 criterion, thus confirming convergent validity (Hair et al., 2020). Although one item in Medical Tourism (MT1) and some in Sustainability Practices (SP7, SP8) and Socio-Cultural

Table 1: Scale development

Construct	Operational definition	Item code	Statements	Source
Medical tourism factors	Medical Tourism Factors denote the extent to which referral hospitals in Uttar Pradesh attract and serve patients from outside the state or country seeking specialized or high-quality treatment. This includes hospital promotion strategies, prioritization of services for medical tourists, infrastructure readiness for international care, communication support, revenue contributions from medical tourism, and perceived quality of care for these patients. Efficiency in handling medical tourists and their referral processes is also included.	MT1	Referral hospitals in Uttar Pradesh actively promote their services to attract medical tourists.	(Crooks et al., 2011)
		MT2	Medical tourists receive priority and specialized services in referral hospitals.	(Chongsuvivatwong et al., 2011)
		MT3	The quality of care for medical tourists in referral hospitals is excellent.	(Walsh and Toleman, 2012)
		MT4	Referral hospitals have adequate facilities to cater to international patients.	(Balogun, 2020)
		MT5	Medical tourism contributes significantly to the revenue of referral hospitals.	(Al Adwan, 2020)
		MT6	Referral hospitals provide sufficient information and assistance to medical tourists.	(Wang et al., 2020)
		MT7	The referral process for medical tourists is efficient and timely.	(Nilashi et al., 2019)
		MT8	Medical tourists experience fewer delays compared to local patients in referral hospitals.	(Çapar and Aslan, 2020)
Sustainability practices	It encompass the environmental and community-oriented strategies adopted by referral hospitals to ensure long-term operational and ecological balance. This involves waste management, energy-efficient technologies, reducing environmental footprints, implementing community social responsibility programs, and involving staff and patients in eco-friendly practices. It also covers hospitals' commitment to regularly monitor, evaluate, and improve their sustainability initiatives.	SP1	Referral hospitals implement effective waste management systems.	(Lianto et al., 2020)
		SP2	Energy-efficient technologies are used in referral hospitals.	(Vovk et al., 2021)
		SP3	Referral hospitals are committed to reducing their environmental impact.	(Chia and Liao, 2021)
		SP4	Social responsibility programs by referral hospitals benefit the local community.	(Selemani et al., 2024)
		SP5	Sustainable resource management is a priority in referral hospital operations.	(Ghasemi et al., 2021)
		SP6	Referral hospitals encourage patients and staff to participate in sustainability efforts.	(Perkumiene et al., 2019)
		SP7	Environmental sustainability enhances the reputation of referral hospitals.	(Cao et al., 2024)
		SP8	Referral hospitals regularly monitor and improve their sustainability practices.	(Aboelkhir et al., 2022)
Socio-cultural factors	Socio-Cultural Factors involve the ability of referral healthcare systems to deliver services that are culturally competent, inclusive, and sensitive to the diverse backgrounds of patients. This includes respecting cultural beliefs, addressing language barriers, ensuring patients feel understood and respected, and tailoring healthcare delivery to meet socio-cultural needs. These factors contribute to patient trust, compliance, and equitable treatment, which in turn impact the perceived and actual efficiency of referral systems.	SC1	Referral hospitals respect the cultural beliefs of their patients.	(Ramirez De Arellano, 2007)
		SC2	Communication between healthcare providers and patients is culturally sensitive.	(Mishra and Sharma, 2021)
		SC3	Language barriers are effectively addressed in referral hospitals.	(Mosadeghrad and Sadeghi, 2021)
		SC4	Patients feel comfortable and understood during their referral experience.	(Ryndin et al., 2022)
		SC5	Trust in healthcare providers influences patients' willingness to follow referrals.	(Sleeboom-Faulkner, 2016)
		SC6	Referral hospitals tailor healthcare services according to patients' socio-cultural needs.	(Jahanbani et al., 2021)
		SC7	Patients from different cultural backgrounds receive equitable treatment.	(Asa et al., 2024)
		SC8	Socio-cultural awareness among staff improves healthcare delivery efficiency.	(Matiza and Slabbert, 2020)
Infrastructure and operational factors	It refer to the physical, technical, and administrative capacities of referral hospitals that facilitate efficient healthcare delivery. These include the availability of medical equipment, presence of specialists, smooth coordination between hospitals, reliable referral tracking systems, and efficient administrative procedures. Staffing adequacy and the quality of the physical environment are also central, all contributing to reduced delays and enhanced patient satisfaction.	IO1	Referral hospitals have adequate medical equipment to handle specialized cases.	(Strack, 2018)
		IO2	Specialists are readily available in referral hospitals.	(Haarhoff and Mokoena, 2017)
		IO3	Coordination between referring and receiving hospitals is smooth and efficient.	(Zargham, 2007)
		IO4	Referral tracking systems are well-maintained and reliable.	(Sengel, 2021)
		IO5	Administrative processes in referral hospitals are streamlined to reduce delays.	(Chitthanom, 2020)
		IO6	Referral hospitals have sufficient staff to manage patient referrals effectively.	(Wen et al., 2021)
		IO7	The physical infrastructure of referral hospitals supports high-quality care.	(Darwazeh et al., 2021)
		IO8	Operational efficiency in referral hospitals positively impacts patient satisfaction.	(Ratnasari et al., 2022)

(Contd...)

Table 1: ***(Continued)***

Construct	Operational definition	Item code	Statements	Source
Referral healthcare system efficiency	Referral Healthcare System Efficiency refers to the effectiveness and responsiveness of healthcare institutions in transferring patients to appropriate higher-level facilities in a timely, coordinated, and patient-centric manner. This includes timely transfer of patients, minimal delays, optimal use of resources, improved treatment outcomes, high patient satisfaction, and transparency in the referral process. It also captures how well hospitals collaborate with each other to ensure continuity and quality of care during referrals.	RH1	The referral healthcare system ensures timely transfer of patients to specialized care.	(Bulatovic and Iankova, 2021)
		RH2	Patients experience minimal delays during the referral process.	(Ward et al., 2024)
		RH3	Referral hospitals utilize resources effectively to manage patient care.	(Teng et al., 2024)
		RH4	The referral system maintains high standards of patient satisfaction.	(Capobianco et al., 2024)
		RH5	Treatment outcomes are improved due to efficient referrals.	(Bahl et al., 2024)
		RH6	The referral healthcare system reduces unnecessary hospital visits.	(Mulindwa et al., 2024)
		RH7	The referral process is transparent and easy to understand for patients.	(Habicht et al., 2024)
		RH8	Coordination among different healthcare providers in the referral system is effective.	(Comulada et al., 2024)

Table 2: Demographic profile of the respondents

Demographic variables	Categories	Frequency	Percentage
Age	Below 18 years	21	5.6
	18-25 years	85	22.8
	years	50	13.4
	36-45 years	61	16.4
	46-55 years	59	15.9
	56-65 years	60	16.1
	Above 65 years	36	9.7
Gender	Male	150	40.3
	Female	222	59.7
Place of residence	Urban area with in Uttar Pradesh	34	9.1
	Rural area within Uttar Pradesh	160	43.0
	Other State in India	178	47.8
Primary reason referral	Need for specialized treatment or expertise	22	5.9
	Lack of equipment or facilities at initial hospital	39	10.5
	Emergency, or critical condition requiring higher care	126	33.9
	Patient's choice/ preference	121	32.5
	Insurance or financial considerations	64	17.2
Mode of transport to the referral hospital	Ambulance	292	78.5
	Private vehicle (own car/taxi)	35	9.4
	Public transport (bus, train, etc.)	45	12.1

Factors (SC7, SC8) showed relatively lower loadings (below 0.60), the overall construct reliability remained acceptable. Moreover, all VIF values were below the critical threshold of 5.0, indicating no multicollinearity issues (Sarstedt et al., 2022). These results confirm that the measurement model is robust and suitable for further structural equation modeling analysis.

Table 4 presents the Heterotrait-Monotrait (HTMT) ratio of correlations used to assess discriminant validity among the study constructs. According to (Sarstedt et al., 2022), HTMT values below the conservative threshold of 0.85, or the more lenient threshold of 0.90, indicate adequate discriminant validity. In this study, all HTMT values ranged from 0.384 to 0.861. The highest observed value was between Socio-Cultural Factors (SC) and Infrastructure and Operational Factors (IO) at 0.861, which is marginally above the conservative benchmark but still within the acceptable range of 0.90. This suggests that while SC and IO share some conceptual overlap, they remain distinct constructs. Other inter-construct relationships, such as between Medical Tourism (MT) and Referral Healthcare System Efficiency (RH) at 0.632, and Sustainability Practices (SP) with other constructs (all below 0.50), further support discriminant validity. Therefore, the HTMT analysis confirms that the constructs in this model are empirically distinct, meeting the recommended validity standards.

Table 5 presents the Fornell–Larcker criterion results for assessing discriminant validity among the constructs. According to (Ringle et al., 2020), discriminant validity is established when the square root of the Average Variance Extracted (AVE) for each construct, displayed on the diagonal, is greater than its correlations with other constructs. In this study, the diagonal values for Infrastructure and Operational Factors (0.761), Medical Tourism (0.770), Referral Healthcare System Efficiency (0.723), Socio-Cultural Factors (0.741), and Sustainability Practices (0.688) all exceed the respective off-diagonal correlation coefficients. For example, the square root of AVE for Medical Tourism (0.770) is higher than its correlation with IO (0.600), RH (0.598), SC (0.651), and SP (0.423). Similarly, Sustainability Practices (0.688) shows the lowest inter-construct correlations, indicating a clear distinction from other latent variables. These results confirm that each construct shares more variance with its own indicators than with other constructs, thereby satisfying the Fornell–Larcker discriminant validity criterion

Figure 2 illustrates the Structural Equation Modeling (SEM) results for the proposed conceptual framework, highlighting

Table 3: Construct loadings, composite reliability, AVE, Cronbach alpha and VIF

Construct	Item code	Construct loadings	Composite reliability	AVE	Cronbach alpha	VIF
Medical tourism factors	MT1	0.457	0.919	0.592	0.898	1.224
	MT2	0.818				2.609
	MT3	0.817				2.612
	MT4	0.781				2.227
	MT5	0.817				2.419
	MT6	0.797				2.242
	MT7	0.794				2.45
	MT8	0.806				2.6
Sustainability practices	SP1	0.718	0.877	0.674	0.847	1.937
	SP2	0.723				1.892
	SP3	0.712				1.904
	SP4	0.748				1.924
	SP5	0.745				2.066
	SP6	0.695				1.846
	SP7	0.616				1.384
	SP8	0.517				1.081
Socio-cultural factors	SC1	0.689	0.904	0.549	0.877	2.669
	SC2	0.679				2.613
	SC3	0.839				2.722
	SC4	0.843				2.686
	SC5	0.858				2.906
	SC6	0.832				2.709
	SC7	0.56				1.88
	SC8	0.546				1.862
Infrastructure and operational factors	IO1	0.656	0.916	0.579	0.898	1.844
	IO2	0.67				1.907
	IO3	0.753				2.479
	IO4	0.762				2.319
	IO5	0.728				2.215
	IO6	0.82				2.531
	IO7	0.865				3.277
	IO8	0.809				2.531
Referral healthcare system efficiency	RH1	0.752	0.897	0.522	0.874	1.825
	RH2	0.757				2.02
	RH3	0.712				2.101
	RH4	0.759				2.142
	RH5	0.677				2.664
	RH6	0.719				2.651
	RH7	0.691				2.365
	RH8	0.71				1.905

Table 4: HTMT criterion

Constructs	IO	MT	RH	SC	SP
IO					
MT	0.625				
RH	0.708	0.632			
SC	0.861	0.743	0.711		
SP	0.433	0.396	0.384	0.457	

Table 5: Fornell-Larker criterion

Constructs	IO	MT	RH	SC	SP
IO	0.761				
MT	0.6	0.77			
RH	0.724	0.598	0.723		
SC	0.77	0.651	0.677	0.741	
SP	0.435	0.423	0.4	0.479	0.688

the hypothesized relationships between Medical Tourism (MT), Sustainability Practices (SP), Socio-Cultural Factors (SC), Infrastructure and Operational Factors (IO), and Referral Healthcare System Efficiency (RH). The path coefficients displayed in the model represent the standardized estimates obtained through SmartPLS analysis, with the strength and significance of each relationship determined via bootstrapping procedures. The visual layout shows that IO has the strongest direct influence on RH, followed by SC and MT, while SP exhibits a weak and statistically insignificant effect. The model fit indices, combined with the significant path coefficients for most constructs, confirm that the proposed framework is robust in explaining variations in referral healthcare system efficiency in the context of medical tourism in Uttar Pradesh. These results visually reinforce the findings reported in the hypothesis testing table, offering a clear representation of the interrelationships among the study variables.

The results of the hypothesis testing (Table 6) offer a detailed empirical assessment of the relationships between the proposed determinants and Referral Healthcare System Efficiency (RH) within the context of Uttar Pradesh's evolving medical tourism landscape. Of the four hypothesized relationships, three were

Figure 2: SEM model

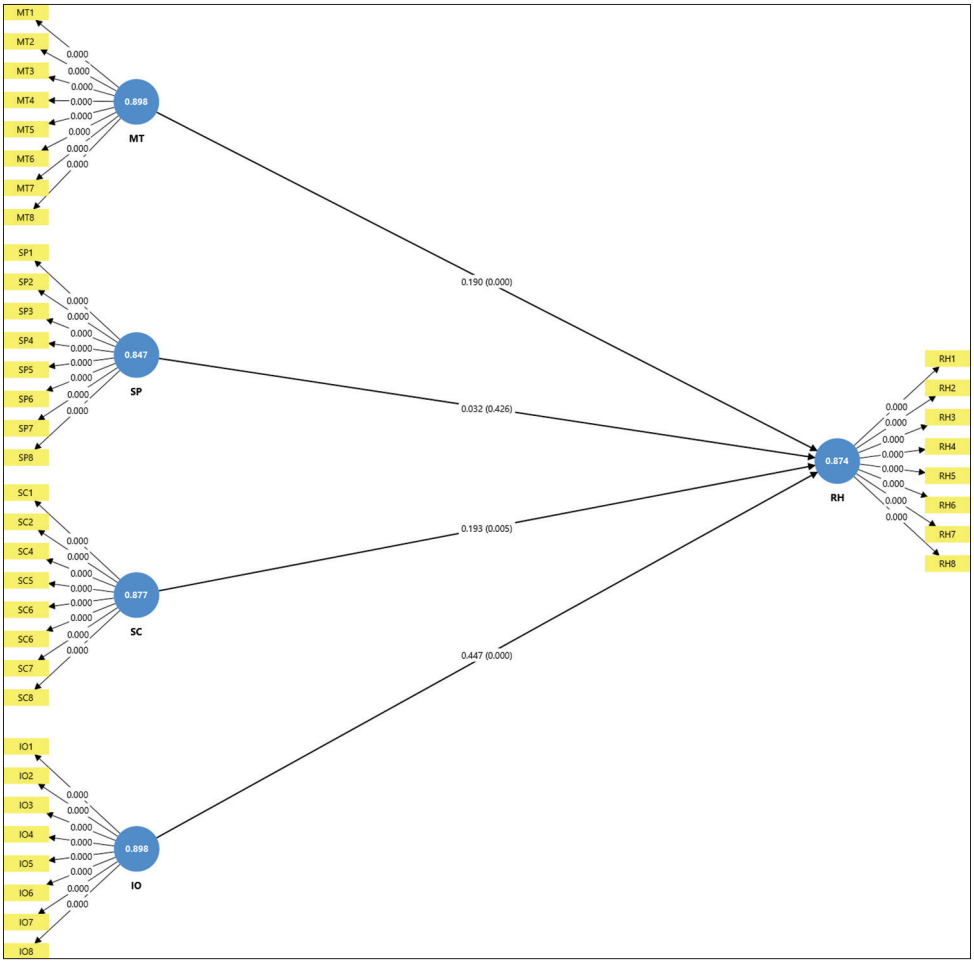


Table 6: Hypothesis testing result

Path	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P-values	Result
IO -> RH	H1	0.447	0.446	0.055	8.191	0	Accepted
MT -> RH	H2	0.19	0.19	0.052	3.683	0	Accepted
SC -> RH	H3	0.193	0.196	0.069	2.809	0.005	Accepted
SP -> RH	H4	0.032	0.034	0.04	0.795	0.426	Rejected

found to be statistically significant and therefore accepted, while one was not supported by the data and consequently rejected.

The first hypothesis **(**H1**)** posited a positive relationship between Infrastructure and Operational Factors (IO) and RH. This path exhibited the strongest effect in the model ($\beta = 0.447$, $t = 8.191$, $P < 0.001$), thereby confirming its substantial influence. The finding underscores that well-equipped medical facilities, the availability of specialist practitioners, robust referral tracking systems, streamlined administrative processes, and effective coordination between referring and receiving institutions significantly enhance the timeliness, reliability, and overall performance of the referral process. These operational strengths promote optimal resource utilization, reduce patient waiting times, and improve treatment outcomes, thereby contributing markedly to referral system efficiency. Accordingly, H_1 is accepted.

The second hypothesis (H_2) examined the effect of Medical Tourism (MT) on RH. The results revealed a positive and statistically significant relationship ($\beta = 0.190$, $t = 3.683$, $P < 0.001$). This finding suggests that referral hospitals engaged in attracting and accommodating medical tourists—through targeted promotion, specialized care protocols, infrastructural readiness for international patients, and comprehensive patient support services—tend to achieve greater operational efficiency in referral processes. The heightened service standards necessitated by medical tourism appear to translate into system-wide improvements in patient flow and coordination. Therefore, H_2 is accepted.

The third hypothesis **(**H_3**)** addressed the influence of Socio-Cultural Factors (SC) on RH. The positive and statistically significant path coefficient ($\beta = 0.193$, $t = 2.809$, $P = 0.005$) supports the premise that socio-cultural competence plays a critical role in enhancing referral efficiency. Culturally responsive healthcare delivery—encompassing respect for patients' beliefs, effective mitigation of language barriers, provision of culturally appropriate services, and assurance of equitable treatment—facilitates improved patient

compliance, fosters trust, and ensures continuity of care across referral stages. As such, H_3 is accepted.

The fourth hypothesis (H_4) tested the relationship between Sustainability Practices (SP) and RH. Although the coefficient was positive ($\beta = 0.032$), the relationship was not statistically significant ($t = 0.795$, $P = 0.426$). This suggests that while certain sustainability initiatives, such as waste reduction, energy-efficient operations, and community-oriented programs, are present within referral hospitals, they do not currently exert a measurable direct effect on operational efficiency in the referral process. This may be attributable to the fact that the benefits of sustainability measures often accrue over extended timeframes and may not directly influence the immediate operational metrics that define referral efficiency. Consequently, H_4 is rejected.

In sum, the empirical evidence confirms that Infrastructure and Operational Factors, Medical Tourism, and Socio-Cultural Factors are significant and positive determinants of Referral Healthcare System Efficiency in Uttar Pradesh, whereas Sustainability Practices**,** despite their long-term strategic value, do not presently demonstrate a significant operational impact. These findings provide a clear basis for prioritising investments and policy interventions aimed at strengthening the state's position as a competitive medical tourism destination while ensuring efficient referral healthcare delivery.

5. DISCUSSION

5.1. Interpretation of Findings

The findings of this study provide empirical evidence that infrastructure and operational factors, medical tourism, and socio-cultural factors are significant determinants of referral healthcare system efficiency in Uttar Pradesh, while sustainability practices do not currently exert a significant direct influence. The strongest predictor, infrastructure and operational capacity, underscores the centrality of adequate physical resources, specialist availability, and process efficiency in ensuring timely and coordinated patient transfers. Medical tourism's positive association with referral efficiency suggests that the heightened service standards and infrastructural readiness required to attract and serve medical tourists generate system-wide improvements that benefit all referred patients. Similarly, the significance of socio-cultural factors confirms the critical role of culturally competent care in improving patient compliance, trust, and satisfaction within referral pathways.

In contrast, the lack of statistical significance for sustainability practices implies that, despite their strategic and ethical importance, current environmental and community-oriented initiatives in referral hospitals are either insufficiently integrated into operational workflows or not yet mature enough to yield measurable efficiency gains. This finding points to a potential implementation gap, where sustainability remains largely peripheral rather than embedded within core healthcare processes.

5.2. Comparison with Previous Literature

The results align with earlier studies that highlight the influence of infrastructure and operational readiness on healthcare service quality and efficiency (Wallace et al., 2024). The positive role of medical tourism echoes the work of (Bouraima et al., 2024) and (Mamataz et al., 2024) who emphasised the spillover benefits of catering to international patients, including improved service delivery systems. The significance of socio-cultural factors corroborates the findings of (Koce et al., 2019) and (Aboelkhir et al., 2022), both of which note that cultural alignment enhances patient trust and compliance, thereby improving healthcare process outcomes.

However, the non-significance of sustainability practices contrasts with the propositions of (Leggat, 2015) and (Medhekar and Wong, 2020), who argue for the operational benefits of environmentally responsible practices. This divergence may be explained by contextual differences; in Uttar Pradesh, sustainability initiatives may not yet be systematically linked to referral process performance, as compared to more developed healthcare systems where such integration is more advanced.

5.3. Theoretical Contributions

The study contributes to theory by integrating perspectives from healthcare operations, hospitality management, and socio-cultural competence into a unified framework for analysing referral healthcare system efficiency. By empirically testing this model in the context of an emerging medical tourism destination, the research extends existing knowledge beyond marketing and clinical quality dimensions to include operational, cultural, and sustainability considerations. Moreover, the findings refine the understanding of sustainability's role, suggesting that its operational impact may be context-dependent and mediated by factors such as organisational maturity and integration into core workflows.

5.4. Managerial and Policy Implications

From a managerial perspective, the findings highlight the need for hospital administrators to prioritise investments in infrastructure, human resources, and process optimisation to strengthen referral efficiency. For facilities engaged in medical tourism, maintaining international service standards can have positive spillover effects on the broader referral network. Training programmes that build socio-cultural competence among staff should be institutionalised to address the needs of a diverse patient base effectively.

From a policy standpoint, state healthcare authorities should incentivise hospitals to upgrade infrastructure, foster inter-hospital coordination mechanisms, and embed cultural competence into service delivery standards. While sustainability did not show a significant direct effect, it remains vital for long-term system resilience; thus, policies should aim to integrate environmental and social responsibility more directly into operational performance metrics.

5.5. Limitations and Future Research

While this study offers valuable insights into the determinants of referral healthcare system efficiency in the context of Uttar Pradesh's medical tourism sector, certain limitations should be acknowledged. First, the study employed a cross-sectional design, which restricts the ability to establish causality among the

variables. Future research could adopt a longitudinal approach to capture changes in referral system efficiency over time and assess the long-term impacts of interventions in infrastructure, medical tourism strategies, socio-cultural competence, and sustainability practices.

Second, the study relied on self-reported data from patients and caregivers, which may be subject to recall bias or social desirability bias. Incorporating multiple data sources—such as hospital performance records, referral tracking system data, and observational assessments—could provide a more objective evaluation of referral efficiency.

Third, the research was geographically focused on major referral hubs within Uttar Pradesh, which may limit the generalisability of the findings to other states or countries with different healthcare structures and levels of medical tourism development. Comparative studies across multiple regions, including both established and emerging medical tourism destinations, could provide a more comprehensive understanding of the model's applicability.

Finally, while sustainability practices were included in the conceptual framework, the study measured their direct effect on referral efficiency. Future research could explore potential mediating or moderating roles, such as whether sustainability enhances efficiency through improvements in patient satisfaction, staff well-being, or hospital reputation. Qualitative studies may also yield deeper insights into how sustainability is perceived and operationalised within healthcare referral networks.

6. CONCLUSION

This study empirically examined the influence of infrastructure and operational factors, medical tourism, socio-cultural factors, and sustainability practices on referral healthcare system efficiency in Uttar Pradesh, India. The findings reveal that infrastructure and operational readiness, medical tourism engagement, and socio-cultural competence are significant and positive determinants of referral efficiency, while sustainability practices, in their current form, do not demonstrate a statistically significant effect.

The study makes three primary contributions. First, it extends the literature on medical tourism and healthcare service delivery by integrating operational, socio-cultural, and sustainability dimensions into a single analytical framework. Second, it offers empirical evidence from an emerging medical tourism destination, thereby contributing to the global discourse on healthcare competitiveness in developing regions. Third, it challenges the assumption that sustainability practices automatically translate into operational efficiency, highlighting the need for context-specific integration into healthcare processes.

From a policy perspective, the results suggest that healthcare administrators and state authorities should prioritise infrastructure enhancement, strengthen inter-hospital coordination, and institutionalise socio-cultural competence training. For medical tourism stakeholders, maintaining international service standards can create positive spillovers that benefit referral processes for all patients. While sustainability initiatives may not currently yield measurable efficiency gains, their long-term strategic value warrants sustained investment and integration into core hospital operations.

In conclusion, this research underscores the complex interplay between medical tourism, healthcare operations, and socio-cultural responsiveness in shaping referral system performance. By addressing both operational imperatives and patient-centred service dimensions, Uttar Pradesh can strengthen its position as a competitive and trusted medical tourism destination while ensuring efficient healthcare delivery for diverse patient populations.

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