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Tourists' Expectations of Experience and Visit Intention in Smart Hospitality: A Moderated Mediation Model of Service Robots.

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ABSTRACT

Purpose—The proposed study examines the effect of technologically empowered service characteristics, i.e., service robot enjoyment, infrastructure quality, and activity diversity in smart hospitality, on Tourist Experience Expectations (TEEE) and Visit Intention (VINT). It fills a gap that is very crucial since it assesses the design triggers in a culturally contextualized manner and also examines how tourists respond to anthropomorphic robots' characteristics.

Study Design/methodology/approach— The study used a cross-sectional experimental design based on a scenario study of 256 Pakistani tourists who were conversant with technology-mediated services. This moderated mediation model was based on the Stimulus Organism Response (S-O-R) model, and it measured the direct effects of the stimulus as well as the conditional interactions. The measures of constructs were based on culturally pre-validated scales, and analysis was performed using Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable to analyse the data in small samples, non-normal data, and complex interaction models.

Findings—The enjoyment of the service robot, variety of activities, and infrastructure had a significant influence on expectations and behavioural intention through TEEE. There was no direct effect of environmental ambiance, which indicated its reduced salience in the context of robotic hospitality. Perceived anthropomorphism failed to moderate the relationship between enjoyment and expectation, suggesting that culture does not embrace a human-like appearance of robots and that it is not universally desirable.

Research Practical Implications—The operators of the Pakistani hospitality sector ought to focus on functionality-first robot design and diversify infrastructure and activity offerings to trigger the development of meaningful expectations. The experiential cues can be combined with behavioural outcomes through scenario-based marketing and segmentation strategies, particularly to younger demographics that are more tech-receptive.

Originality/value—The work provides one of the earliest culturally adaptable conceptions of stimulus asymmetry in robot tourism and an argument against anthropomorphic suppositions in the design of hospitality. It builds on the S-O-R paradigm by putting TEEE as a central cognitive-affective processor and exposes the contextual limits to emotional technology acceptance.

Keywords: Service robot enjoyment, cross-cultural hospitality, scenario-based experience, tourist experience expectations, technology-mediated experience, emerging market tourism.

JEL Classification Codes: M31, D91, O33, Z32

1 | INTRODUCTION

The global tourism industry has experienced transformational change in recent years, due to the increased pace of technology adoption, shifting consumer expectations, and the post-COVID-19 pandemic (Asif & Fazel, 2024). Digitally enhanced ecosystems, representing hospitality innovation and automation, have become the focus of hospitality, deploying service robots to concierge, housekeeping, and guest management segments to minimize contact, guarantee consistency, and alleviate workforce pressure (Sun et al., 2025b). Robotic services are becoming the norm in premium hospitality services in technologically advanced areas, including East Asia and Europe, which indicates an expansion of emotionally-oriented and expectation-focused service design (Cheng & Hwang, 2025). Conversely, the emerging economies, such as Pakistan, are at an early phase of service automation. Although the piloting effects of robot waiters and intelligent hotel projects have received favourable consumer responses (Ahmed, 2017; Khan & Mehmood, 2024), the understanding of the cognitive and emotional response of local tourists towards the technologies that facilitate service cues, particularly in a collectivist cultural context, is limited. This gap in knowledge poses an exceptional opportunity to investigate the psychological and sociocultural limits of robot-mediated hospitality, especially in the framing of Tourist Experience Expectations (TEEE) and Visit Intention (VINT).

Although the implementation of robotic systems in the hospitality industry is already global, minimal data are available regarding emerging economies. Scant knowledge exists regarding how multisensory stimuli of services combine into meaningful anticipations and shape intentions of tourists to participate in innovative hospitality services. Furthermore, the moderating effect of anthropomorphism, which is presumed to create an emotional involvement, is not rigorously tested across cultures, and thus remains unclear whether it can apply to collectivist cultures such as Pakistan. The experiential effect of service robots is under-researched in the context of hospitality. The literature on the subject matter establishes that perceived enjoyment enhances consumer attitudes (Huang et al., 2024), but does not critically analyse the interaction between technological cues and other environmental and infrastructural factors to create consistent expectation schemas. Furthermore, the common belief that anthropomorphism would lead to acceptance (Qian & Wan, 2024) is increasingly being challenged, particularly in non-Western environments, where cultural awkwardness can trigger the uncanny valley effect (Shum et al., 2024; Zhang et al., 2020). Pakistan is a young but potentially open market for smart hospitality innovation (Khan et al., 2025). The prototype applications, such as Jalbot Chef and robotic waiters, have elicited a positive response among consumers (Ahmed, 2017; Cabrilo et al., 2024); however, there is limited scholarly research on the subject. The country has a collectivist culture and has had minimal experience with humanoid interfaces, which is why it is crucial to know how local tourists perceive such technologies cognitively and emotionally.

The research takes the Stimulus-Organism-Response (SOR) paradigm (Russell & Mehrabian, 1977) to examine the interaction of key service design stimuli, such as the perceived enjoyment of service robots, environmental ambience, activity diversity, and infrastructure quality that form coherent experience expectations and affect behavioural intention. Key, it examines the culturally relative part of perceived anthropomorphism in shaping these relationships, providing an integrative model of asymmetrical stimuli and mediated intention formation. The objectives of the current study are to evaluate the immediate impact of

service robot pleasure, environmental atmosphere, variety of activities, and infrastructural quality on Tourist Experience Expectations (TEEE). Secondly, test the TEEE as a mediator of the connection between these stimuli and Visit Intention (VINT). Thirdly, assess the impact of perceived anthropomorphism as a moderator of the relationship between enjoyment of service robots and TEEE within a collectivistic cultural setting. The following research questions for the current study follow these objectives;

RQ1: What are the effects of service design stimuli, especially robot enjoyment, activity diversity, and infrastructure, on Tourist Experience Expectations and the effect on Visit Intention in Pakistani innovative hospitality environments?

RQ2: Would perceive anthropomorphism enhance or undermine the correlation between robot enjoyment and Tourist Experience Expectations in a collectivist cultural setting?

2 | LITERATURE REVIEW

2.1 | Technological stimuli and Smart hospitality

Service robots, which represent autonomous or semi-autonomous machines that carry out assistive, non-manufacturing tasks (ISO 8373:2012) (Model, 2022), have become a trend of post-pandemic innovation in hospitality. Globally, this is evidenced by their incorporation into concierge, check-in, and food services, due to the shift to contactless, consistent, and scalable experiences for guests (Ivanov, 2025). Nevertheless, empirical research is influenced chiefly by individualistic cultures. Although they focus on such operational advantages of robots as trust and convenience (Alma Çallı et al., 2023), they downplay the cognitive-affective effect of robots on Tourist Experience Expectations (TEEE), particularly pre-visit and in low-tech and collectivist cultures.

This is an inadequate oversight. Perceived enjoyment, which can be described as the inherent enjoyment of interacting with technology (Igbaria et al., 1995), is a cue that would probably trigger emotional appraisal and symbolic anticipation. However, its experiential weight is seldom represented in tourism S-O-R models. The mere assumption that robots are novel is not sufficient; it must be the case that they are a source of anticipatory pleasure that is capable of influencing behavioural outcomes. In emotional markets with immature automation, such as in Pakistan, perceived enjoyment can have an outsized effect on expectation schemas. Identified Gap and Contribution. The literature gap is filled with integrative models that (1) relate service robot-generated delight to anticipation of experience and visit intention, and (2) take into consideration culturally relative reactions to anthropomorphic design. This paper addresses this gap by providing empirical evidence of these connections in a non-Western hospitality context, within a moderated mediation framework based on the S-O-R model.

H1: *Perceived enjoyment of service robots has a significant impact on the visit intention of customers*.

2.2 | Expectations and Experience Formation through Affective-Cognitive Expectations

Tourist Experience Expectations (TEEE) are not fixed predictions- they are evolving mental conditions created through cognitive estimations and feeling estimations concerning future travel (G. G. Liu et al., 2025).

Sheng and Chen (2013) also extended that tourist expectations of the experiences ahead include symbolic anticipation, including escapism, identification, and cultural fantasy. Wang et al. (2016) take the concept further by modelling it structurally, where destination imagery and motivation are associated with the depth of expectation. The issue is two-fold. To begin with, TEEE is often modelled as post-visit assessments, which overlooks its predictive salience. Second, not many incorporate technological stimuli, and the formation of expectations is limited to traditional features of destinations. This is addressed by recent work by Bernaki and Marso (2023), which is inspired by the experiential economy of Pine and Gilmore (1998), focusing on multisensory triggers and co-creative dynamics as main principles, which suit the service environment of robots well. Although Bernaki and Marso (2023) model brings an important digital-era perspective but Sheng and Chen (2013) Model stands out for its depth, pertinence, and theoretical foundation. TEEE in the SOR framework is an organism that is influenced by stimuli such as service robots, infrastructure, and activities. The article posits that TEEE is not merely a mediator; rather, it is a focal affective processor, and converts stimulus resonance into a desire to act.

H2: *Service robots have a positive relationship with tourists' experience expectations*

H3: *Tourists' experience expectations significantly impact the visit intention formation of a tourist*

2.3 | Cultural Moderators: Re-Evaluating Anthropomorphism

Perceived anthropomorphism can be described as the extent to which the quality of non-humans, i.e., service robots, is attributed a human-like character, such as emotions, style of communication, and social presence (Epley et al., 2007). Within hospitality settings, such traits are theorized to foster emotional connection and enhance co-experience (Saputra et al., 2024). However, the use of anthropomorphism is not universally evident; psychological, contextual, and cultural factors mediate its effects (Song et al., 2024). The three-factor theory by Epley posits that anthropomorphic perception arises from Elicited agent knowledge, whereby the perception of human-like properties leads to the assignment of human motives. Reflectance motivation, in which the users desire predictability and control of complex systems. Sociality motivation enables people to meet social needs through interaction with human-like agents. When used in the context of hospitality robots, such motivations can enhance tourists' expectations of their experience by increasing emotional appeal and perceived hospitality (Qian & Wan, 2024). In the Stimulus-Organism-Response (SOR) model, perceived anthropomorphism is a psychological stimulus that can affect the state of the organism, in this case, tourists' cognitive-affective expectations (TEEE), and determine behavioural response and visit intention.

Nevertheless, past studies provide inconsistent results. Western-centric research indicates that anthropomorphism increases trust and acceptance (Said et al., 2024; Wu et al., 2023), whereas other scholars point out feeling awkward and expectation disconfirmation when robots have uncanny human features (MacDorman, 2024; Shum et al., 2024). These inconsistencies highlight the relevance of taking into account ethnocultural boundaries, particularly in collectivistic cultures where human-human interaction is favoured and where robotic interfaces can be a source of breaking social norms (Tussyadiah et al., 2020a). Furthermore, the role of anthropomorphism in shaping pre-visit expectations in tourism has not been rigorously tested in

empirical research, nor has its interaction with perceived enjoyment, which can serve as a strengthening condition. The literature is saturated with operational and attitudinal measures (Alma Çallı et al., 2023; Belanche et al., 2021; Choi et al., 2021) and little attention to the experiential cognition or mediation pathways, particularly in emerging markets such as Pakistan. This paper fills these gaps by empirically testing the hypothesis that perceived anthropomorphism directly increases tourists' experience expectations. Evaluation of whether anthropomorphism enhances the influence of service robot enjoyment on forming expectations.

H4: *The experience expectation of the tourists is positively related to the perceived anthropomorphism.*

H5: *The relationship between service robot enjoyment and experience expectations of the tourists is moderated by perceived anthropomorphism*

2.4 | Behavioral Response and Mediation Logic

Tourist experiences are dynamic, cumulative psychological constructs shaped by intersecting environmental, infrastructural, activity-based, and technological stimuli (Sheng & Chen, 2013; Zhang et al., 2023). Traditional research segments these into conative, affective, or cognitive images (Chen et al., 2025; Yang et al., 2022), overlooking how multiple stimuli merge to form holistic expectations. Amenities and infrastructure anchor pre-travel cognitive schemas, while diverse activities and service design enrich anticipatory experiences (Yörük et al., 2024). Although the influence of destination image on behaviour is well documented (Taecharungroj, 2022).

H6: *The Environment positively affects the tourists' experience expectations*

H7: *Diverse activities positively affect the tourists' experience expectations*.

H8: *Tourists' site infrastructures positively affect the tourists' experience expectations.*

Visit Intention (VINT) refers to the mental promise and action plan of the tourist to use a service offering. (B. Liu et al., 2025). Past studies have determined that the environmental cues and infrastructure positively influence VINT (Alma Çallı et al., 2023). Thus far, they do not reflect the ways these factors act indirectly, by forming expectations. This paper establishes TEEE as the mediator between stimuli and behavior. It claims that behavioral intent in tech-enabled hospitality is seldom motivated by isolated cues; rather, it is the outcome of the combination of affective anticipation and cognitive preparedness (B. Liu et al., 2025; Sun et al., 2025a). The model attributes the cause of visit intention to robot pleasure, infrastructure, and actions, which is tested to determine whether they cause VINT due to their first-order effect on TEEE, which is hypothesized to enhance theory and provide predictive validity. However, empirical findings have yet to establish the mediating effect of tourists' experience and expectations on the relationship between environment, miscellaneous events, and the infrastructure of the tourist site. Furthermore, this study examines the mediating effect of TEEE on the relationship between service robots and the intention to visit. Hence, the study draws on the S0R theory and amalgamates various stimuli, such as the hotel environment, tourist site infrastructure, diverse activities provided at the hotel, and perceived enjoyment of service robots, to examine the mediation mechanism of tourist experience expectations (organism).

H9a: *Tourist experience expectation mediates positively between the environment and visit intention.*

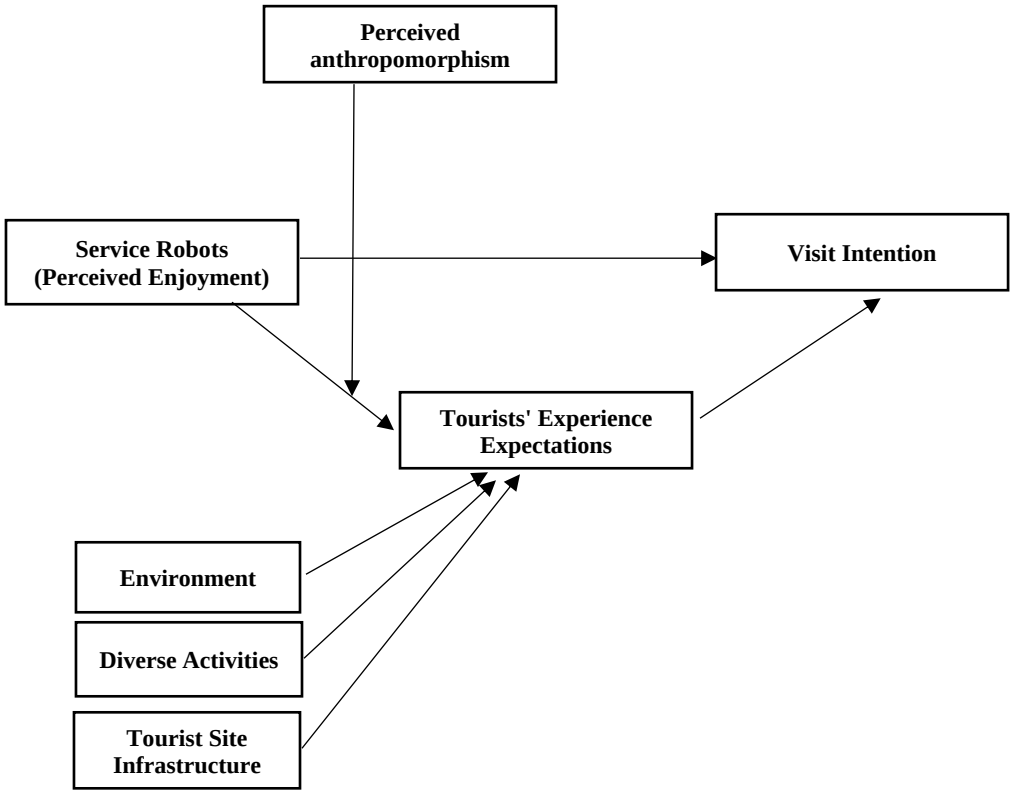
H9b: *Tourists' experience and expectation mediate positively between diverse activities and intention to visit.*

H9c: *Tourists' experience and expectation mediate positively between the infrastructure of the tourist site and intention to visit.*

H9d: *Tourists' experience and expectation mediate positively between intention to visit and service robots.*

Figure 1

Conceptual Model



3 | METHODOLOGY & DESIGN

To simulate smart hospitality interactions, the scenario-based experimental design was proposed (Scholze et al., 2022). Participants watched videos featuring curated footage of service robots (e.g., a robotic Watchman) performing hotel roles in real-life settings. This type of scenario-based experiment is popular for finding solutions to managerial and customer behaviour-related instances (Bendoly et al., 2006; Schweitzer & Gibson, 2008). The design focused on contextual immersion by using culturally mediated visual prompts and descriptive prompts, rather than a control group or manipulation check, to maintain ecological validity. This approach allows an adequate simulation of a hospitality situation and maintains a degree of experimental control, especially in markets that have not been exposed to robotic services. The participants were shown a

set of videos and pictures of service robots (e.g., robotic watchmen and concierge agents) in operation (e.g., doing ordinary hotel tasks). As a substitute for relying on a control group or operational check, which could have weakened engagement, the study emphasized ecological cogency through culturally-situated pictorial and narrative cues. All the items adapted to existing scales were forward-coded and checked by three experts in the field (two tourism scholars and one robotic interaction designer). Back-translation procedures were used to ensure translation and semantic equivalence. A pilot test using 40 Pakistani respondents was used in order to determine linguistic clarity and experiential relevance. The deletion of items with low item-total correlation and low reliability, which are Env3 and TEEE1-TEEE4, was done by mutual agreement of the expert judges. This dimensionality maintenance construct refinement-maintained dimensionality and increased the internal consistency and cultural fidelity.

A 5-point Likert scale was employed in measurement, which was selected on pilot feedback that preferred simplicity and interpretability over the 7-point scales. Also, Cummins and Gullone (2000) advocate this structure of emotional and experiential domains, especially when conducting cross-cultural studies, where the anchoring of scales can differ. The constructs were cross-mapped to the Stimulus-Organism-Response (S-O-R) model, where service robot enjoyment, environmental ambiance, and infrastructure served as the stimulus, the Tourist Experience Expectations (TEEE) as the organism, and visit intention as the response. Perceived anthropomorphism was hypothesized as a moderator, with the theoretical basis for this hypothesis being Epley's three-factor theory, which posits that cues of human-like appearance increase emotional response and predictability (Epley et al., 2007). The measurement items were borrowed based on proven scales: enjoyment (Igbaria et al., 1995), environmental constructs (Phillips & Jang, 2007), TEE (Sheng & Chen, 2013), and visit intention (Liu & Goodhue, 2012). The tech-aware Pakistani tourists were a new segment with few formal registries, but the snowball non-probability sampling strategy was applied to reach them (Dusek et al., 2015). Early demographics were diverse in terms of gender, age, region, and education, and two-level referral chains were employed to minimize bias. Out of the 400 questionnaires distributed, 256 were usable, which constituted a 64% response rate. The survey was conducted in a hybrid format, with face-to-face sessions during tourism expos and online through secure university networks. Data collection employed a hybrid mode—in-person surveys at hospitality expos and secure online distribution via institutional channels. Ethical approval was obtained from Bahria University's Research Ethics Board, and informed consent was collected with full confidentiality assurances.

4 | RESULTS and ANALYSIS

The data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS v3.2.8. The use of PLS-SEM rather than Covariance-Based SEM (CB-SEM) was based on the fact that PLS-SEM is more suitable for theory development, prediction-based models, and complex moderated mediation patterns, particularly in situations involving non-normal data and smaller sample sizes (Hair Jr et al., 2017; Sarstedt et al., 2023). In contrast to CB-SEM, which presupposes multivariate normality and is typically applied when testing the theory, PLS-SEM is more flexible because both measurement and structural models can be estimated simultaneously. As a measure against possible common method bias (CMB), Harman's single-factor test was performed, which showed that no single factor could explain most of the

variance (<35%). Further, a complete collinearity test revealed that all the VIFs were less than 3.3, indicating that there was no multicollinearity and CMB issues. Data were analysed from 256 valid responses (64% response rate), comprising 58.9% males and 41.1% females. The majority of respondents (60.9%) fell within the 25 -35 age range, and 77.3% of them had prior experience in travel and hospitality, which lends credence to their situational applicability and cognitive maturity in assessing technology-enabled tourism experiences.

Table 1

Demographic Characteristics of Respondents

	Variables	**Frequency**	**Percentage**
Age	25-35	154	60.9%
	36-45	77	30.4%
	46-55	16	6.3%
	56 and above	6	2.4%
Gender	Male	149	58.9%
	Female	104	41.1%
Education	Bachelor	46	18.3%
	Masters	167	66.3%
	Doctorate	17	6.7%
	Others	22	8.7%
Tech exposure *HOST	Yes	197	77.3%
	No	58	22.7%

***Note:** HOST =Has the participant recently stayed in an automated hotel*

3.1 | Non-Response Bias Evaluation

The t-test analysis was used to compare the early respondents (the first 30%) and late respondents (the last 30%) on core constructs: Service Robot Enjoyment (SR), Tourist Experience Expectations (TEEE), and Visit Intention (VINT). It is assumed that those who respond late are approximations of non-respondents (Armstrong & Overton, 1977). The statistically significant differences could not be identified, as shown in Table 2. A meaningful behavioural difference was observed with age segmentation in the PLS SEM multigroup test. The variation in path strength indicates that younger tourists are more emotionally and behaviorally sensitive to the enjoyment of service robots, which contributes to the specialization of segmentation strategies in astute hospitality marketing.

Newer Tourists (less than 35 years): 0.493, $t = 5.31$, $p < .001$

Older Tourists (35 years and more): 0.274, $t = 2.83$, $p = .005$

Table 2

Non-biased response test via an independent sample t-test

Construct	Early Responders (Mean ± SD)	Late Responders (Mean ± SD)	t-value	p-value	Conclusion
SR Enjoyment	4.01 ± 0.62	3.98 ± 0.66	0.423	0.673	No significant difference
TEEE	3.89 ± 0.71	3.92 ± 0.68	-0.382	0.703	No significant difference
Visit Intention	3.94 ± 0.65	3.91 ± 0.69	0.311	0.756	No significant difference

**Service robots (SR), Tourist experience expectations (TEEE), Visit Intention (VINT)*

3.2 | Measurement Analysis

Composite Reliability (CR) and Cronbach's Alpha were used to measure the reliability and validity of the model by following the thresholds of 0.70 or higher (Hair et al., 2019; Sarstedt et al., 2019). In pilot testing, a few items were found to be unreliable and had low item-total correlations; these were removed before full-scale data collection, including Env3 and TEEE1-TEEE4. Four items of TEEE (TEEE1-TEEE4) were dropped because of low reliability. These objects were symbolically deep, e.g., memory alignment, fantasy connection, and character interaction. Their omission reduced the imaginative and narrative range of the construct and narrowed the final construct to more concrete expectations, such as social proximity, historical immersion, and perfected environments. Such recalibration does not rule out TEEE as the organism but does render its cognitive layer more experience-based and realism-oriented, which is consistent with the Pakistani consumer familiarity. This was because it enhanced conceptual clarity and measurement accuracy, especially on culturally adapted scales. The results of final CR (Table 3) values were higher than the acceptable standards: Diverse Activities (.79), Environment (.82), Tourist Infrastructure (.82), Service Robots (.93), Tourist Experience Expectations (.83), and Visit Intention (.91). Reliability of indicators was also tested through satisfactory outer loadings. The revisions demonstrate a rigorous pre-validation procedure that facilitated the integration of imported constructs within the experiential context of tourism in Pakistan.

Table 3a

Outer Loadings

Construct	Item Code	Outer Loading
Environment	Env1	0.83
	Env2	0.79
	Env4	0.76
	Env5	0.75
Diverse Activities	DivAc1	0.85
	DivAc2	0.80
	DivAc3	0.83
Infrastructure	TouInf1	0.74
	TouInf2	0.85
	TouInf3	0.76
	TouInf4	0.83

***Note**: Dropped items in validation included Env3, TEEE1–TEEE4 due to low reliability.*
**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT)*

Table 3b

Reliability

Measures	Cronbach's Alpha	Composite reliability	AVE
Env1-5	0.82	0.88	0.65
DivAc1-3	0.79	0.87	0.70
Toulnf1-4	0.82	0.88	0.66
SerRob1-4	0.93	0.95	0.82
PerAnt1-6	0.94	0.95	0.76
TEEE5-10	0.83	0.87	0.54
Vint1-3	0.91	0.94	0.85

**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT)*
***Note**: CR > 0.70, AVE > 0.50 indicate acceptable reliability and convergence (Hair et al., 2019).*

Furthermore, the convergent validity is measured through the AVE, and outer loadings were evaluated. Average values extracted and outer loadings were within range, i.e., 0.5 and 0.7, respectively (Bagozzi & Yi, 2012).

The Fornell-Larcker and HTMT criteria were used to determine discriminant validity. The Fornell-Larcker test revealed that the √AVE of each of the constructs surpassed their inter-construct correlations (Table 4), which indicates distinctiveness among constructs. The HTMT ratio was also used to overcome its shortcomings. The HTMT values were all less than 0.90, and the 95 percent confidence intervals did not include 1 (Table 5), which means that there was strong discriminant validity. This confirms theoretically that conceptually similar constructs, such as service robot enjoyment, anthropomorphism, and expectations of the experience, are empirically distinct. This will help in the structural clarity of the model and the absence of overlapping constructs to distort the psychological interpretation of the tourist responses.

Table 4

Fornell & Larcker

Constructs	DIVACT	EVNT	PERANT	SR	TEE	TOUINF	VINT
Diverse Activities	0.84						
DIVACT	0.474	0.81					
ENVT	0.351	0.218	0.877				
PERANT	0.374	0.183	0.658	0.911			
SR	0.523	0.391	0.516	0.493	0.736		
TEEE	0.672	0.613	0.354	0.322	0.541	0.812	
TOUINF	0.466	0.285	0.54	0.612	0.626	0.409	0.922
VINT							

**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT)*

Table 5

HTMT Ratio

Constructs	DIVACT	EVNT	PERANT	SR	TEE	TOUINF	VINT
DIVACT							
ENVT	0.59						
PERANT	0.40	0.24					
SR	0.43	0.20	0.70				
TEE	0.62	0.47	0.56	0.52			
TOUINF	0.83	0.73	0.39	0.36	0.64		
VINT	0.54	0.32	0.58	0.66	0.67	0.46	

**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT)*

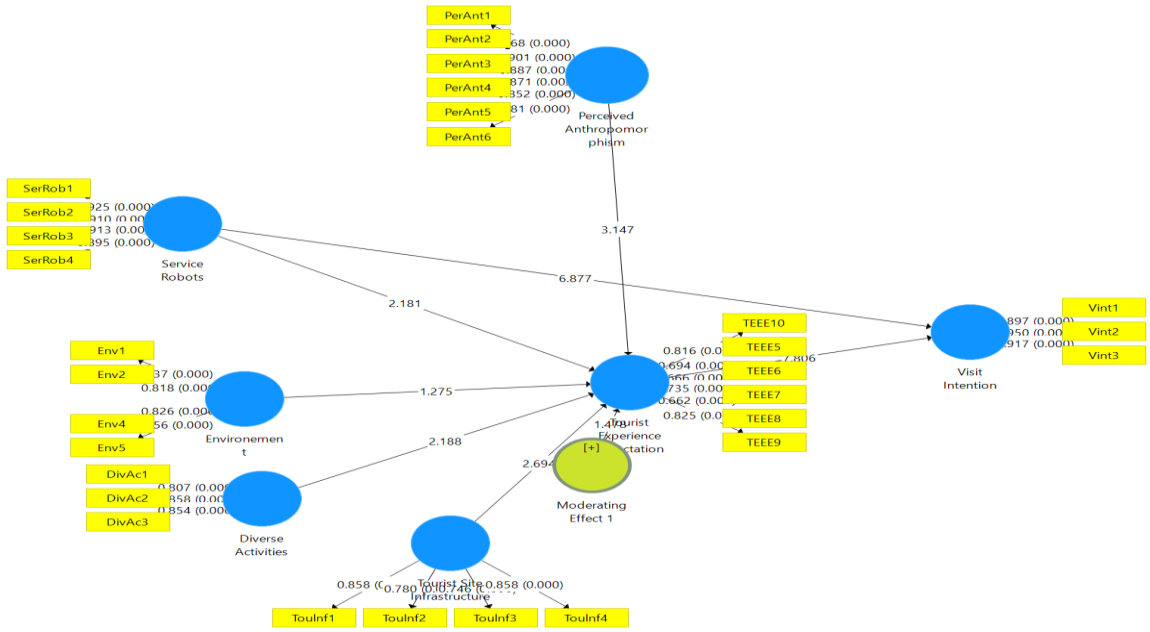
3.3 | Structural Evaluation

SmartPLS was used to evaluate the structural model in terms of path coefficients, effect size (f2), explanatory power (R2), and predictive relevance (Q2) based on 5,000 bootstrapped resamples. R2 values of TEEE (0.46) and Visit Intention (0.51) were also above the proposed value by Muhammad (2019) of 0.26, which shows a high degree of explanatory power. The effect sizes (f2 0.31) were significant in all constructs except environment, and Q2 ranged between 0.23 and 0.41, further indicating the predictive strength of the model. In theory, these results confirm the Stimulus-Organism-Response (S-O-R) model in a technology-based tourism environment, that is, the asymmetrical stimuli, such as robot enjoyment, infrastructure, and activity diversity, can differentially affect internal cognitive-affective states (TEEE), which eventually shape behavioural intention. This corroborates the claims of Sheng and Chen (2013) and Wang et al. (2016) that pre-visit expectations are multi-dimensional and behaviourally significant, rather than the echo of environmental ambiance.

Furthermore, the strong explanatory power of the model is also consistent with recent research in the field of hospitality technologies (Ivanov, 2025; G. G. Liu et al., 2025), which stresses the importance of design-driven stimuli as a significant factor affecting consumer choice. The insignificance of environmental ambiance points to a cultural phenomenon- that in collectivist and tech-emergent cultures, tourists might ground their anticipations in functional and experiential realities, rather than the sensory ambiance, which challenges the premise of the conventional destination image theory (Phillips & Jang, 2007).

Figure 2

Structural Evaluation



**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT)*

Table 6a

Direct Effects

Hypotheses Relationship	Std. β	St. Dev.	p-values	Decision
SR-> VINT	0.11	0.05	0.00	Supported
SR->TEEE	0.17	0.08	0.02	Supported
TEEE->VINT	0.62	0.05	0.00	Supported
PANT->TEEE	0.27	0.08	0.00	Supported
ENVT->TEEE	0.08	0.06	0.20	Not supported
DIVACT->TEEE	0.18	0.08	0.02	Supported
TOUINF -> TEEE	0.21	0.08	0.00	Supported

**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT), R2 = Coefficient of determination, F2 =Effect Size, Q2 Predictive Relevance*

Table 6b

Predictive Relevance of the Model

Endogenous Construct	Exogenous Predictor	f^2 (Effect Size)	R^2 (Explained Variance)	Q^2 (Predictive Relevance)	Interpretation
TEEE	SR (Service Robot Enjoyment)	0.03	0.46	0.23	Small practical influence
	DIVACT (Activity Diversity)	0.03			Small effect
	TOUINF (Infrastructure Quality)	0.03			Small effect
	ENVT (Environmental Ambiance)	0.00			Negligible influence
	PERANT (Anthropomorphism)	0.06			Moderate contribution
VINT	SR	0.24	0.51	0.41	Moderate practical impact
	TEEE	0.28			Substantial effect

**SRMR = 0.064 < 0.08 threshold, indicating good model fit. $R^2 > 0.26$ = substantial; $Q^2 > 0$ = predictive relevance; $f^2 > 0.15$ = moderate to large effect (Cohen, 1992).*

The model showed good fit (Standardized Root Mean Square Residual (SRMR) = 0.064 is lower than the recommended value of 0.08 (Dijkstra & Henseler, 2015a, 2015b). All the latent constructs exhibited a sufficient level of reliability and discriminant validity. Effect sizes (f2) were also interpreted above statistical levels:

SR to VINT (f 2 = 0.24): Moderate practical effect

TEEE to VINT (f 2 = 0.28): A large practical impact

ENVT to TEEE (f 2 = 0.00): Theoretically unfounded and insignificant

These are the areas where managerial interventions (robot design, infrastructure investments) will have a good chance of producing palpable behavioural changes.

3.4 | Moderation

PLS can provide more accurate estimates of moderator effects by accounting for errors that decrease the estimated relationship and refining the validation of the theory (Ali et al., 2016). Although the interaction between perceived anthropomorphism and service robot enjoyment was hypothesized to influence expectations, the analysis revealed a non-significant beta ($\beta = 0.07$, $p = 0.14$). This suggests that anthropomorphism does not strengthen or weaken the relationship between robot enjoyment and tourist experience expectations in this cultural setting. The result aligns with the “uncanny valley” phenomenon and Hofstede’s theory of uncertainty avoidance in collectivist societies.

Table 7

Moderation

Hypothesis Relationship	Beta β	St. Dev.	P-values	f 2	Confidence Interval		Decision
					CI-LL 2.50%	CI-UL 97.50%	
SR * PANT -> TEEE -> VINT	0.07	0.02	0.14	0.01	-0.01	0.07	Not supported

**Service robots (SR), Perceived anthropomorphism (PANT), Tourist experience expectations (TEEE), Visit intention (VINT), *St.Dev. =Standard Deviation, CI-LL=Confidence Interval Lower Limit, CI-UL=Confidence Interval Upper Limit*

The moderated mediation (Index = 0.07, p = 0.14) was evaluated by Preacher and Hayes (2008) using bootstrapping and did not provide significant conditional indirect effects.

3.5 | Mediation

The results of mediation analysis confirmed Tourist Experience Expectations (TEEE) as an important mediating mechanism between service stimuli and Visit Intention (VINT). Direct influence of service robots on VINT (b = 0.11, p < .001) did not change much after including TEEE, but the indirect path SR TEEE VINT (b = 0.11, p =.03) showed some mediation effect. Diverse Activities (beta = 0.11, p =.04) and Site Infrastructure (beta = 0.13, p =.01) also showed significant indirect effects, making it clear that the stimuli influence behavioural intention via experiential cognition. On the contrary, environmental ambiance did not have a significant indirect effect via TEEE (p = .21), implying that it does not influence pre-visit expectations as powerfully in this case. In theory, these findings support the idea that Sheng and Chen (2013) propose: TEEE is a cognitive-affective processor within the S-O-R model. It screens the external stimulation into internal psychological states, which affect decision-making. The importance of SR, activity diversity, and infrastructure proves that functional and interactional cues are the main drivers of anticipatory experience in new markets.

Moreover, the slight contribution of ambiance confirms cultural-contextual results (Tussyadiah et al., 2020b), with material, practical signals considered more important than atmospheric stimuli in collectivist, technology-immature settings. The findings contribute to the current body of knowledge in terms of confirming TEEE as a partial mediator, as opposed to a passive outcome, and show that tech-mediated hospitality is all about expectation-building, as opposed to stimulus exposure, when it comes to behavioural intention.

Table 8

Mediation

Hypotheses Relationship	Beta β	St. Dev.	p values	Confidence Interval		Decision
				CI-LL 2.50%	CI-UL 97.50%	
ENT -> TEE -> V'INT	0.05	0.03	0.21	-0.02	0.09	Not supported
DIVACT -> TEE -> V'INT	0.11	0.04	0.05	0.00	0.16	Supported
TOUINF -> TEE -> VINT	0.13	0.04	0.01	0.03	0.16	Supported
SR -> TEE -> V'INT	0.112	0.04	0.03	0.00	0.17	Supported

**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Tourist experience expectations (TEEE), Visit intention (VINT)*
**St.Dev. =Standard Deviation, CI-LL=Confidence Interval Lower Limit, CI-UL=Confidence Interval Upper Limit*

Table 9

Hypothesis summary table

Hypothesis	Relationship	Std. β	p-value	Result
H1	SR → VINT	0.11	0.00	Supported
H2	SR → TEEE	0.17	0.02	Supported
H3	TEEE → VINT	0.62	0.00	Supported
H4	PERANT → TEEE	0.27	0.00	Supported
H5	SR × PERANT → TEEE	0.07	0.14	Not Supported
H6	ENVT → TEEE	0.08	0.20	Not Supported
H7	DIVACT → TEEE	0.18	0.02	Supported
H8	TOUINF → TEEE	0.21	0.00	Supported
H9a	ENVT → TEEE → VINT	0.05	0.21	Not Supported
H9b	DIVACT → TEEE → VINT	0.11	0.05	Supported
H9c	TOUINF → TEEE → VINT	0.13	0.01	Supported
H9d	SR → TEEE → VINT	0.11	0.03	Supported

**Significance threshold set at p < .05 for all paths*
**Service robots (SR), diverse activities (DIVACT), Environment (ENVT), Tourist site infrastructure (TOUINF), Tourist experience expectations (TEEE), Visit intention (VINT)*

5 | DISCUSSION

The current study extends the Stimulus-Organism-Response (S-O-R) model (Russell & Mehrabian, 1977) to understand the effect of asymmetric service design stimuli on tourist behaviour in the context of brilliant hospitality in the Pakistani context. Empirically, service robot pleasure, infrastructure quality, and the variety of activities had a significant influence on Tourist Experience Expectations (TEEE), and the latter served as a potent mediator of Visit Intention (VINT). These findings are consistent with Wang et al. (2016), who contended that affective forecasting supports destination expectations, and they go further to incorporate technological cues in the pre-visit cognition in a multidimensional conceptualization of TEEE as proposed by Sheng and Chen (2013). Importantly, the insignificant moderation effect of anthropomorphism (0.07, p = .14)

begs theoretical revisions. Although the three-factor model by Epley et al. (2007) proposes human-like characteristics as a way of establishing emotional connection and predictability, the recent cross-cultural evidence is a warning against this possibility. Anthropomorphism can lead to uncertainty or awkwardness in collectivist societies such as Pakistan, in which normative expectations are determined by interpersonal harmony and social propriety (MacDorman, 2024; Shum et al., 2024). These findings justify empirically the view of Roselli et al. (2025) who defend localized thresholds of acceptance in Human-Robot Interaction (HRI). Consequently, as opposed to increasing engagement at large, anthropomorphic features can hamper cognitive fluency and emotional safety in high power-distance environments.

The significant multi-group differences based on age (beta = 0.493 <35 and beta = 0.274 >=35) indicate the existence of meaningful segmentation. The youthful tourists will be more emotionally receptive to the robotic engagement, probably because they are more tech-savvy and used to interacting with hybridized social interfaces. Managers ought to roll out immersive, scenario-based services to this group of people via visually attractive robot assistants. Conversely, older generations might like minimalistic/utilitarian robots that are not too anthropomorphic in appearance and design, in line with the Said et al. (2024) and Song et al. (2024) studies on age variability in robot acceptance. Direct implications of these insights are at the policy level. Regulators ought to come up with localized standards of robotics that are focused on functionality rather than form when it comes to high-contact service environments. Staff training should be provided on how to deal with robots. Scenario-based marketing and preview experiences with technology may set expectations in advance (Cabrilo et al., 2024; Chen et al., 2025). Improved infrastructure and selection of activities, which both demonstrated complete mediation to TEEE, are especially promising to enhance intelligent hotel engagement. Overall, this paper presents a culturally-sensitive, subtle framework of experience construction. It shows that emotionally notable, yet culturally appropriate design, rather than anthropomorphic faithfulness, is the secret to successful human-robot service provision in emerging-market tourism.

5.1 | Theoretical Implications

This paper improves the S-O-R model by validating that the effects of stimuli are not symmetrical, with robot enjoyment, infrastructure, and diversity of activities being influential in the Tourist Experience Expectations (TEEE), and the environmental ambiance not. It goes against the conventional tourism paradigms and demonstrates the necessity to reconsider the role of sensory stimuli in tech-mediated environments (Sheng & Chen, 2013; Wang et al., 2016). The non-significance of the moderating effect of anthropomorphism, though theoretically well supported (Epley et al., 2007), indicates a cultural boundary. Humanoid characteristics can lead to discomfort instead of interaction in collectivist cultures such as Pakistan (MacDorman, 2024; Roselli et al., 2025). Therefore, anthropomorphism ought to be considered as a contingent variable, a variable that needs to be recalibrated in HRI and hospitality robotics design theories. TEEE becomes a key mediator, not a passive structure, but an active processor of multi-source stimulation, and this raises its theoretical level in modelling experiences.

5.2 | Practical Implications

The design of robots that prioritize functionality over humanoid features is necessary in Pakistani hospitality, as humanoid features will interfere with emotional clarity. Managers ought to emphasize the reliability and competency of tasks more than imitation. The use of age-specific approaches is justified:

younger guests (<35) are open to robotic interaction, which is suitable for contextual and story-centric activities. The hybrid service models can serve the traditional categories with limited design hints. Intention is influenced by infrastructure and activity diversity through the formation of expectation. Hospitality planners need to invest in experiential offerings that are in line with emotional anticipation, not physical properties. The policymakers are to create culturally competent design criteria, facilitate workforce transitions, and market and educate about tech literacy. The previews based on scenarios and localized service flows will assist in matching the expectations and the real product, thus minimizing friction and enhancing behavioural commitment.

5.3 | Policy Implications

Regulators and tourism authorities in emerging markets should develop clear guidelines for integrating service robots, with a focus on safety, data privacy, and interoperability. Infrastructure improvements (transport, connectivity, accessibility) can be financed through the use of public-private partnerships, helping to provide robotic services and support additional activities. Displaced workers should be trained in workforce transition programs to take on management and maintenance positions, ensuring that the integration of technology does not result in the loss of local employment. The government tourism boards should fund cross-cultural studies and pilot programs to customize the design of robots to local tastes, and consumer-education programs can help mitigate automation anxiety and alleviate the effects of the uncanny valley phenomenon. Aligning technology policy with the principles of the experiential economy, policymakers will be able to drive the sustainable and inclusive growth of technology-enabled tourism.

5.4 | Limitations

This research has a number of limitations that shape its scope and generalizability. One, the non-probability snowball sample creates a risk of sampling bias. Although data diversity was guaranteed by age, gender, region, and education, the sample was highly tech-savvy, and this could produce a skewed reflection of positive attitudes toward robotic services and suppress other views. Second, participation might have been biased through self-selection because those who already showed interest in digital hospitality were more likely to choose participation, restricting the representativeness. Third, even though the scenario-based experimental design is more ecologically realistic (Scholze et al., 2022), it does not permit causal inference. There is no control group, or live interaction with robots, and the results are an indication of how people form intentions in a simulated environment, not how they change their behaviour. Also, the deletion of items (e.g., TEEE1-TEEE4) limited the domain of expectation measurement, where tangible dimensions are given more importance than symbolic ones, and this can limit the psychological depth.

5.5 | Future Research Directions

In order to expand on reflections gained in this study, a number of strategic directions are to be considered in future research. Ecological validity would be reinforced by the field experiments where the interactions with live service robots would provide an opportunity to understand the interactional trust and emotional responsiveness in real-time (Cabrilo et al., 2024). With the limitations on cultural moderation in mind, it is possible to empirically confirm the boundaries of anthropomorphism and the possibility of the uncanny valley effect by conducting comparative research in different societies with different power distance and uncertainty avoidance rates (Japan vs. Brazil) (Roselli et al., 2025; Said et al., 2024). Moreover, the robotic service

recovery situations are to be examined to know the emotional resilience and consumer response to service breakdowns (Rana et al., 2025; Shum et al., 2024). This can involve analyzing the re-engagement of trust through scripted apologies or fallback protocols. Also, the experimental research of design-oriented acceptance levels, e.g., voice realism, facial animation, or movement cues, could be used to fine-tune the robot embodiment in culturally sensitive environments (Li et al., 2024; Song et al., 2024). Lastly, the longitudinal research would show the elasticity of expectations and habituation patterns as the expectation of tourist experience and visit intention were tracked during repeated exposures or as tech familiarity increases (Yang et al., 2022; Zha et al., 2024). Such future directions are the direct response to the limitations and theoretical tensions revealed in this work and the foundation of a culturally responsive and emotionally competent innovative hospitality ecosystem.

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***Appendix I:** Items and codes

Measures	Statements
Environment	
Env1	The tourist site accommodation is perceived to be clean
Env2	The tourist accommodation is perceived to be safe
Env4	Tourist site perceived to have pleasant weather
Env5	Tourist site perceived to have attractive scenery
Diverse Activities	
DivAc1	The tourist site is perceived to have a variety of entertainment opportunities
DivAc2	The tourist site is perceived to have a variety of night life
DivAc3	The tourist site is perceived to provide plenty of shopping facilities
Tourist site infrastructure	
Toulnf1	The tourist site is perceived to have good public and private transportation available
Toulnf2	The tourist site is perceived to have plenty of interesting cultural and historic site
Toulnf3	The tourist site is perceived to have convenient airline schedules available to the destination city
Toulnf4	The tourist site is perceived to have a variety of suitable accommodation
Service Robot	
SerRob1	Perception of using the Robot (automated services) gave me lots of pleasure
SerRob2	Perception of using the robot (automated services) gave me enjoyment
SerRob3	Perception of using robot in tourist accommodation is positive
SerRob4	Perception of the actual process of using robot is pleasant
Perceived Anthropomorphism	
PerAnt1	Perceiving that the personal intelligent agent is able to speak like human is more favourable
PerAnt2	Perceiving that the personal intelligent agent can be happy is acceptable
PerAnt3	Perceiving that the personal intelligent agent can be friendly is helpful
PerAnt4	Perceiving that the personal intelligent agent can be respectful is favourable
PerAnt5	Perceiving that the personal intelligent agent can be funny is acceptable
PerAnt6	Perceiving that the personal intelligent agent can be caring is acceptable
Tourist Experience Expectation	
TEEE5	During the trip, I expect to be able to approach core characters related to topic, such as having a conversation or taking pictures with the main characters after watching performance
TEEE6	During the trip, I expect to be identified, such as traveling with companions with similar interests.
TEEE7	During the trip, I expect to be close to the legend of my memories, or see a legendary character or scene.
TEEE8	During the trip, I expect to experience some historic content or feelings, such as seeing environments of the time, set as old towns and streets.
TEEE9	During the trip, I expect to have fantasy experiences, such as robots servicing the hotel.

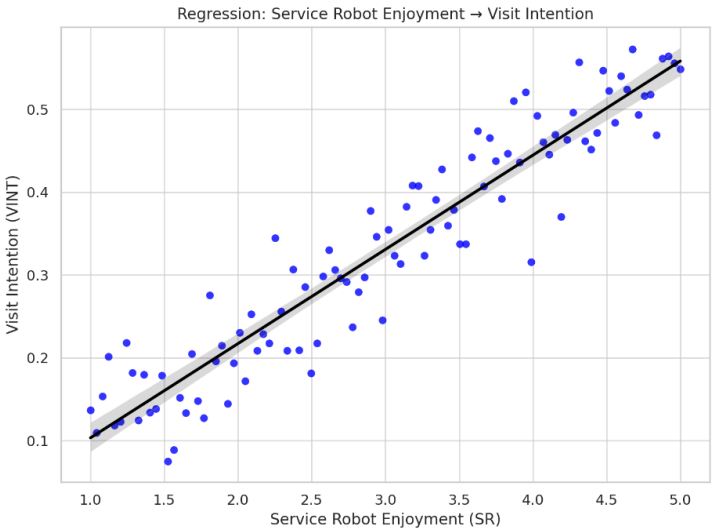
TEEE10	During the trip, I expect to experience the fulfilment of my hopes and visions, such as visiting an unpolluted environment or an ideal new town constructed by robots.
Visit Intention	
Vint1	I am willing to stay at an automated hotel while travelling to the northern areas of Pakistan.
Vint2	I plan to stay at an automated hotel when travelling with family.
Vint3	I will make an effort to stay at an automated hotel while travelling to a tourist destination.

Table: Summary Type VAF Table

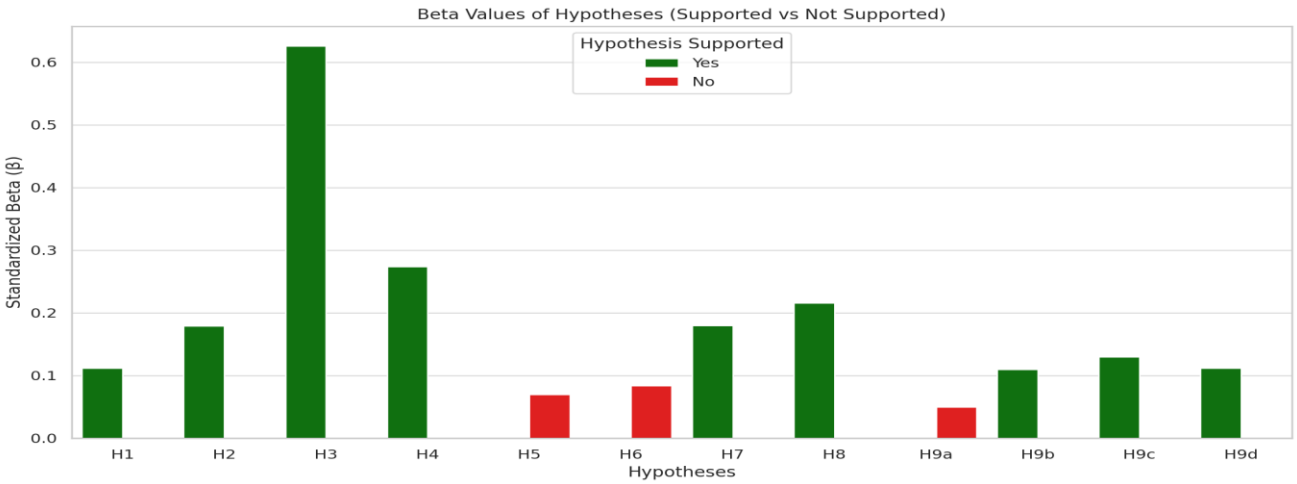
Pathway	INDE	DE	TE	VAF	Mediation Type
SR → TEEE → VINT	0.112	0.112	0.224	50%	Partial Mediation
DIVACT → TEEE → VINT	0.11	~0	0.11	100%	Indirect-only
TOUINF → TEEE → VINT	0.13	~0	0.13	100%	Indirect-only

**INDE=Indirect Effect, DE=Direct Effect, TE=Total Effect, VAF=Variance Accounted For*

Appendix II
Regression graph



Summarized Beta Values graph for hypothesis testing.



Summarised values of VAF