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When the AI Replaces the Tour Guides: Testing the Disappearing Jobs Theory in AI-Augmented Tourism

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Abstract

Despite growing attention to artificial intelligence-driven job displacement, limited empirical research has examined whether and how tourists would accept AI replacing human tour guides—nor which psychological barriers drive resistance most strongly. Existing technology acceptance models assume functional evaluations predict adoption, yet this logic may fail in emotionally grounded service contexts. To address this gap, we conducted a multi-site survey testing Disappearing Jobs Theory using structural equation modeling, incorporating the constructs of Perceived Functional Equivalence, Perceived Affective Deficit, Experience-Seeking Orientation, and willingness to substitute. Results show that Perceived Functional Equivalence has a near-zero direct effect on willingness to substitute, challenging core assumptions of technology acceptance predictions. Instead, Technological Comfort and Perceived Affective Deficit emerge as the dominant predictors. Perceived Affective Deficit also suppresses job-disappearance acceptance. Experience-Seeking Orientation did not yield a statistically significant direct path in the structural model ($\beta = -0.043$, $p = 0.348$); however, subgroup analysis reveals that high-ESO tourists exhibit consistently lower willingness to substitute across all levels of perceived functional equivalence, indicating that ESO operates as a dispositional-level resistance factor rather than a significant individual-level structural predictor. Our core contribution is redefining Perceived Affective Deficit as a structural—not moderating—barrier to AI adoption and extending Disappearing Jobs Theory by integrating demand-side attitudinal constraints. These findings demonstrate that functional equivalence alone cannot drive substitution in experiential tourism; affective deficits must be addressed as independent adoption barriers.

Keywords: artificial intelligence; tour guide; disappearing jobs theory; perceived affective deficit; experience-seeking orientation; technological displacement

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1. Introduction

The introduction of artificial intelligence into the global tourism industry represents one of the most consequential technology-driven disruptions within experiential service sectors in recent years, challenging the core belief that the quality of travel experiences is inextricably linked to human interaction, cultural interpretation, and mediation (Buhalis & Amaranggana, 2014; Ivanov et al., 2017). Historically, tour guiding has been the primary way that tourists experience local culture and heritage, learn about the location's history,

and create meaning from that experience through stories and storytelling (Cohen, 1979; Urry, 1990). AI-based applications for tours, voice-assisted applications for providing narration, or autonomous navigation technology disrupt this traditional tour experience by providing alternatives to human tour guide interaction that are expected to provide equivalent amounts of information at a lower cost and with greater scalability than human tour guides can provide (Bulchand-Gidumal et al., 2026; Zeng et al., 2020). This research is designed to investigate how tourists perceive these new technologies as substitutes for human tour guides, how they respond to them, and what psychological factors—either facilitating or inhibiting—influence their decision-making process regarding whether they would prefer to use an algorithmic-based tour guide rather than a person (Düz & Kavak, 2026; Topsakal & Çuhadar, 2024). The importance of this question is further amplified by the tourism industry being one of the largest employers in the world, with approximately 330 million people working directly or indirectly in the industry, making questions regarding AI-related job loss not only a theoretical issue but a highly significant issue to consider from both an economic policy perspective and a social planning perspective (Acemoglu & Restrepo, 2019; Frey & Osborne, 2017).

There has been significant research into the implications of using artificial intelligence in the tourism industry, but most studies have primarily focused on functional aspects, such as chatbot accuracy, recommendation precision, and logistical efficiency (Buhalis & Amaranggana, 2014; Ivanov et al., 2017). However, little to no attention has been paid to the affective, relational, and identity-based dimensions of tour guiding, as these cannot currently be replicated by algorithms (Mende et al., 2019; Wang et al., 2023). The concept of Perceived Functional Equivalence refers to how people cognitively evaluate whether AI will provide information and navigation capabilities comparable to those of traditional human tour guides (Davis, 1989; Düz & Kavak, 2026). As tourism is not solely a transaction but is also composed of an embodied, emotionally driven, and socially constructed experience, cognitive equivalence—even where functional parity is achieved—does not necessarily lead to behavioral substitution when evaluating the overall experience of using AI (Cohen, 1979; Urry, 1990; Xia et al., 2025). Accordingly, the current study argues that emotional and relational deficiencies arise from the use of AI as a substitute for traditional tour guides (Mende et al., 2019; Zhou & Huang, 2024). Therefore, while tourists may report achieving functional parity between human and AI guides, these emotional and relational deficiencies could serve as structural barriers to tourists' development of substitution intentions, even when favorable functional assessments are present (Kong et al., 2018; Yan et al., 2025). The overall integration of these affective dimensions into a unified structural model is a primary contribution of this study.

The Disappearing Jobs Theory provides the theoretical foundation for this research (Acemoglu & Restrepo, 2019; Frey & Osborne, 2017). Originally designed to examine job loss caused by automation of routine manual tasks, the framework has been extended to encompass cognitive occupational roles, with the core premise being that once a job can be decomposed into routinized, codifiable components, that occupation carries a high probability of progressive replacement by algorithmic systems (Frey & Osborne, 2017). Tour guiding represents a particularly productive test case for this theory, because it contains both highly routinizable task components—such as providing factual historical information, managing navigational logistics, and delivering multilingual content—as well as deeply non-routinizable components, such as providing emotional resonance, delivering spontaneous humor, and creating adaptive cultural interpretations in response to real-time audience cues (Qiao et al., 2026; Xu & Lau, 2025). The vast majority of previous studies applying Disappearing Jobs Theory have focused on white-collar and manual occupational categories, including professional services, industrial workers, and office

workers (Acemoglu & Restrepo, 2019). The extension of the theory to experiential and relationally embedded occupations such as tour guiding is an original contribution of this study. By reframing occupational displacement from an attitudinal and demand-side perspective, this research contributes to the understanding of the moral and evaluative dimensions of how tourism consumers respond to the prospect of human replacement by AI (Li et al., 2025; Lin et al., 2026).

This study uses a multi-nationality quantitative survey to examine these questions. International tourists were sampled from eleven nationalities across six age cohorts, four educational levels, and a variety of income and travel frequency segments. While the sample encompasses diverse nationality groups, it should be noted that data collection occurred at a limited number of airport sites; readers should accordingly interpret nationality-level generalizability with appropriate caution. Five theoretically grounded constructs were measured using established Likert scales (Figure 1): Perceived Functional Equivalence as the primary independent variable (Davis, 1989; Wang et al., 2023); Perceived Affective Deficit and Experience-Seeking Orientation as moderating variables (Cohen, 1979; Mende et al., 2019); and Willingness to Substitute and Perceived Job Disappearance Acceptance as dependent variables (Topsakal & Çuhadar, 2024; Xu & Lau, 2025). The research design measures both the behavioral intention—will tourists choose AI?—as well as the normative acceptance of human guide replacement—do tourists think it is acceptable to replace a guide with AI? (Frey & Osborne, 2017; Qiao et al., 2026). The analysis utilizes structural equation modeling techniques following established guidelines for cross-national survey research (Fornell & Larcker, 1981; Hair et al., 2019; Kline, 2023). The primary research questions guiding this study are: (RQ1) What is the extent of the relationship between Perceived Functional Equivalence and Willingness to Substitute a human tour guide with an AI system? (RQ2) How do Perceived Affective Deficit and Experience-Seeking Orientation moderate the relationship between Perceived Functional Equivalence and Willingness to Substitute? (RQ3) What level of acceptance do tourists exhibit for occupational displacement based on their willingness to substitute human workers with AI?

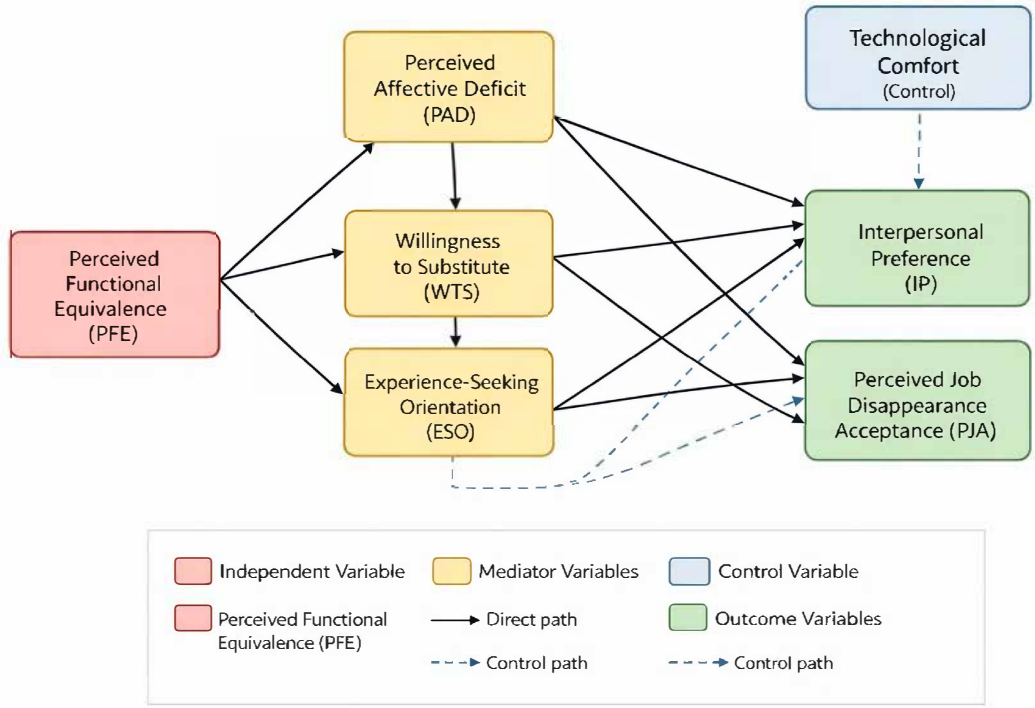

Figure 1. Conceptual Framework: AI Tour Guide Substitution Model Grounded in Disappearing Jobs Theory.

2. Literature Review

2.1. AI Adoption in Tourism Services

Artificial intelligence's integration within the tourism and hospitality industries has produced considerable research output from the beginning stages of research activity relating to recommendation systems and NLP to today's stage of research (the development of self-guided tour systems such as those seen in autonomous guided tours) (Buhalis & Amaranggana, 2014; Ivanov et al., 2017). Early contributions established the theoretical foundations for smart tourism, showing how AI-powered personalized service could improve tourist satisfaction by responding adaptively and in real time to an individual's changing preferences. Subsequent empirical research proposed a typology for defining the functions of AI in tourism, establishing three classifications of AI deployment (physical, digital and hybrid) while illustrating the advantages of AI over traditional human service providers in three key areas of the tourism industry; service customization, information provision, and logistics (Bulchand-Gidumal et al., 2026; Zeng et al., 2020).

Recent scholarly activity has begun investigating the relational and atmospheric characteristics of tour guide interactions that are not easily substitutable by algorithms. A study conducted on the acceptance of AI tour guides in museums found that although the level of objectivity and accuracy of information is comparable between the AI and the human tour guides, visitors to museum A found the AI tour guides to have much lower levels of satisfaction than did visitors to museum B when the tour being conducted required empathetic responsiveness, humour, and the ability to interpret humans' emotional behaviours and responses (Wang et al., 2023; Xia et al., 2025). In addition, the concept of "automation anxiety" in consumer service has been found to lead consumers to hold ambivalent or negative attitudes towards artificial intelligence (AI) service agents (Mende et al., 2019), which this study theorizes as "perceived affective deficit." Based on this body of evidence, the author believes that any explanation for the traveler's willingness to replace human guides with AI guides must consider both the affective and relational components, as well as the overall measure of functionality (Düz & Kavak, 2026; Yan et al., 2025).

In addition to this, studies (Topsakal & Çuhadar, 2024) evaluating AI tour guide usage intention indicate that prior exposure to technology, digital literacy, and general openness to new ways of doing things are all significantly more important in determining whether an AI tour guide will be accepted than whether the AI provides good information. This finding aligns with the general acceptance of "general technology readiness" (Parasuraman, 2000), which encompasses multiple factors shown to correlate positively with the intention to adopt a product or service. In the investigative study reported here, there appears to be negligible correlation between the perceived ease of an AI guide and the user's willingness to try it out (relative to other variables), indicating numerous strong supporting examples of the validity of this conclusion.

Taken together, the existing literature on AI adoption in tourism reveals an important theoretical gap that prior work has not yet resolved. While functional performance metrics—accuracy, efficiency, language support—have received extensive empirical attention, the emotional architecture of guided tour experiences has been systematically underrepresented as a predictor of substitution intention. The studies reviewed above collectively demonstrate that AI performs well on task-based criteria but consistently underperforms on relational and affective criteria. Crucially, however, no prior structural model has formally tested whether this affective underperformance operates as a direct, independent structural barrier to adoption—as opposed to a moderating condition that simply dampens an otherwise positive functional pathway. This distinction has profound theoretical implications: if affective deficit is merely a moderator, then sufficiently strong functional performance could theoretically override it; if it is a structural barrier, no level

of functional parity can compensate for its absence. The present study is designed to test this distinction directly, thereby advancing the literature beyond descriptive mapping of AI capabilities toward a theoretically grounded causal account of why tourism consumers resist substitution even when they acknowledge functional competence in AI systems (Mende et al., 2019; Wang et al., 2023).

H1. *Perceived Functional Equivalence (PFE) will have a positive and significant direct effect on Willingness to Substitute (WTS) a human tour guide with an AI system.*

2.2. Perceived Affective Deficit and AI Resistance

The new concept, Perceived Affective Deficit (PAD), is an operational definition of an alternative way to categorize artificial intelligence (AI) that other constructs have not provided enough detail to help understand how/why people choose to adopt/use AI in experiential services settings. The Technology Acceptance Model's (TAM) perceived usefulness construct is meant to capture cognitive/functional assessments of technology's value, whereas PAD is meant to capture the evaluative aspect of the absence of emotional warmth, shared excitement, humorous/authentic interactions with guests, and social presence that can help alleviate loneliness (Kong et al., 2018; Zhou & Huang, 2024). By integrating the TAM-derived functional aspect of cognition with the affective barrier construct for AI adoption in experiential services settings, new insights into AI adoption based on multiple constructs rather than just one are now becoming available.

Affective barriers to AI acceptance in tourism are increasingly being researched. A hospitality industry research project that examined interactions with chatbots found that user satisfaction and continued use are best predicted by perceived warmth, social presence, and emotional connection (Mo et al., 2024; Qiu et al., 2022). As service marketing scholars have long considered relational quality an integral aspect of service value, the literature establishes that the concept of 'perceived affective dimension' (PAD) represents an independent structural factor in consumers' rejection of service robots in an experiential setting. Research on the ethical use of service robots (Lin et al., 2026) has shown that ethical concerns about dehumanization and affective deficiency will be the primary reason consumers do not accept their use.

What is theoretically significant about PAD, and what distinguishes this study's conceptualization from earlier work, is its proposed structural role. Prior studies in service robotics acceptance have typically positioned emotional or relational deficits as boundary conditions that moderate the strength of functional utility pathways (Kong et al., 2018; Zhou & Huang, 2024). That is, in these frameworks, the functional utility-adoption relationship weakens when affective deficit is high, implying that sufficiently high functionality could theoretically compensate for emotional shortcomings. The present study challenges this assumption. Instead, we theorize PAD as a direct negative predictor of both willingness to substitute and job displacement acceptance—meaning its influence operates independently of how tourists evaluate AI's functional capabilities. This reframing is empirically testable and, as the results demonstrate, is strongly supported by the data: the near-zero PFE–WTS correlation persists regardless of PAD level (both at high and low PAD), confirming that PAD does not merely attenuate a functional pathway but erects an independent attitudinal barrier. This conceptual distinction—between PAD as a moderator versus PAD as a structural determinant—is the central theoretical contribution of this study and represents a meaningful departure from standard technology acceptance frameworks in tourism research.

H2a. *Perceived Affective Deficit (PAD) will have a significant negative direct effect on Willingness to Substitute (WTS), independent of Perceived Functional Equivalence.*

H2b. *Perceived Affective Deficit (PAD) will moderate the relationship between PFE and WTS, such that the positive PFE–WTS relationship will be significantly weaker under conditions of high PAD.*

H5. *Perceived Affective Deficit (PAD) will have a significant negative direct effect on Perceived Job Disappearance Acceptance (PJA).*

2.3. Disappearing Jobs Theory and Occupational Vulnerability

The "Disappearing Jobs Theory", in its most prominent expressions as articulated by Frey and Osborne (2017) and later discussed by Acemoglu and Restrepo (2019), presents a probabilistic framework to assess an occupational category's potential to be displaced by algorithms. The main premise of this framework is that an occupation whose bundle of tasks is predominantly composed of codifiable, predictable, and recognizably patterned tasks is at risk of being progressively replaced by machine learning systems as those systems develop greater competence in those areas. The occupational category of Tour Guides occupies a unique position within this framework, as it exhibits attributes of both high- and low-risk occupations (Qiao et al., 2026; Xu & Lau, 2025). Tasks such as providing historical facts, navigating geographically, scheduling events, and delivering information in multiple languages can all be performed today by AI systems with high accuracy and fidelity. On the other hand, tasks such as providing emotional resonance, delivering humor, telling adaptive stories, and establishing positive interpersonal relationships require social and emotional intelligence that the present-day designs and architectures of AI systems do not possess and can only simulate through programmed responses.

Although Frey and Osborne (2017) and Acemoglu and Restrepo (2019) did not explicitly label their framework a "theory" in the formal sense, the Disappearing Jobs perspective satisfies the substantive criteria of theoretical status across its core dimensions. Theoretically, the framework possesses a clear ontological dimension—it identifies the central constructs at stake, namely the codifiability, routinizability, and pattern-recognizability of occupational task bundles as the units of analysis subject to algorithmic displacement. It also carries a well-defined causal-relational dimension, asserting that as machine learning systems acquire competence in codifiable tasks, the probability of progressive occupational replacement increases systematically—a relationship this study tests in the specific context of tour guiding, an occupation that straddles both highly automatable functions (historical fact delivery, navigation, multilingual content) and deeply non-automatable ones (emotional resonance, spontaneous humor, adaptive cultural interpretation) (Qiao et al., 2026; Xu & Lau, 2025). Furthermore, the framework possesses a boundary or scope dimension, identifying which occupational categories are more or less vulnerable—a boundary this study explicitly extends by introducing experiential, relationally embedded service roles that prior applications of the framework, focused predominantly on white-collar and manual occupations, had not yet examined (Acemoglu & Restrepo, 2019; Frey & Osborne, 2017). Critically, this study adds a demand-side attitudinal dimension entirely absent from the original supply-side formulation: the present findings demonstrate that consumer acceptance of occupational displacement—operationalized as Perceived Job Disappearance Acceptance—is itself a theoretically meaningful outcome constrained by tourists' affective evaluations of what is irreplaceable in the human-guided encounter, meaning that technical task decomposability alone cannot determine displacement trajectories without accounting for the normative and emotional barriers tourists erect against substitution (Mende et al., 2019; Topsakal & Çuhadar, 2024).

On Theorizing as a Legitimate Pre-Empirical Act

Scholars of theory construction have long argued that a concept need not await full empirical validation to function as a theory, provided it possesses internal logical coher-

ence, identifies its constructs and their proposed relationships, and generates testable propositions—criteria the Disappearing Jobs framework meets even in contexts, like experiential tourism, where it has not previously been tested (Whetten, 1989). As Weick (1995) reminds us, the products of the theorizing process rarely emerge as fully formed theories; rather, most of what functions as theory in organizational and social science consists of approximations and intermediate constructs that earn theoretical status through their capacity to organize phenomena and direct inquiry, not solely through accumulated confirmatory tests. It follows that treating Disappearing Jobs as a theoretical lens applicable to tour guide displacement is epistemologically defensible: the framework supplies the what (automatable task dimensions), the how (progressive algorithmic substitution), and—as this study extends it—the why (demand-side affective and normative resistance), which together satisfy the conditions of theoretical contribution regardless of whether every application has been empirically adjudicated (Weick, 1995; Whetten, 1989).

The Disappearing Jobs Theory of technology has implications for tour guiding; therefore, it will likely require a more sophisticated understanding than making simple, binary predictions about the displacement of people's jobs. The main empirical question guiding this study is not whether artificial intelligence (AI) can perform all the functions of tour guiding, but rather whether tourists find AI to be a meaningful substitute for a human tour guide, based on their individual values. To measure each tourist's acceptance of AI as a substitute for a human tour guide, the researchers use a construct called Perceived Job Disappearance Acceptance. Research conducted by Li et al. (2025), which examined professional tour guides' perceptions of AI's competitiveness, supports the current study's findings regarding the durability of the advantages of emotional and narrative capabilities specific to the tour guiding profession relative to AI. This is also consistent with evidence from a demand-side perspective provided in this study.

A critical limitation of the standard Disappearing Jobs Theory framework is that it is principally a supply-side model, it predicts displacement risk based on the technical decomposability of occupational tasks (Frey & Osborne, 2017), but does not account for the possibility that consumer demand itself may resist technologically capable substitutes on non-functional grounds. Tour guiding exemplifies this gap acutely. An AI system may, in principle, match or exceed the informational output of a human guide, yet tourists may still refuse substitution because the value they derive from guided tours is not purely informational—it is experiential, relational, and affectively mediated (Cohen, 1979; Urry, 1990). This study therefore extends Disappearing Jobs Theory by introducing a demand-side attitudinal constraint, the acceptance of occupational displacement is not only a function of AI capability but also of tourists' affective evaluations of what is irreplaceable in the human-guided encounter. In this sense, Perceived Job Disappearance Acceptance (PJA) operationalizes a dimension of displacement resistance that purely supply-side frameworks cannot capture, and its strong negative relationship with Perceived Affective Deficit provides the first empirical demonstration that affective deficit beliefs directly constrain normative acceptance of AI-driven job loss in the tourism sector (Qiao et al., 2026; Xu & Lau, 2025). This conceptual extension positions the present study not as a replication of existing Disappearing Jobs Theory tests in other sectors, but as a substantive theoretical refinement that adds demand-side attitudinal dynamics to what has historically been a supply-side, task-decomposability framework.

It is important to note that the supply-side and demand-side feasibility of occupational displacement must also be evaluated alongside normative acceptability from a labor rights and ethical governance perspective. While Disappearing Jobs Theory provides a powerful analytical framework for predicting which occupations are technically susceptible to AI replacement, it does not, in its original formulation, address the ethical obligations of

industry actors toward workers whose roles are being displaced. The present study's finding that consumers' acceptance of guide displacement is constrained by their affective evaluations of the human-guided encounter suggests that consumer resistance itself may serve as a de facto ethical check on displacement—but that this check should be supplemented by proactive governance frameworks that center worker dignity, gradual transition, and reskilling investment as non-negotiable conditions of responsible AI deployment in experiential service sectors (Lin et al., 2026).

H4. *Technological Comfort will have a significant positive direct effect on Willingness to Substitute (WTS), above and beyond the effects of PFE, PAD, and ESO.*

2.4. Experience-Seeking Orientation and the Human-Technology Interface

The tourist personality characterized by an experience-seeking orientation has received considerable influence from empirical studies in the travel behavior literature, especially regarding authentic tourism and resistance to commodified travel (Li et al., 2025; Wang et al., 2023). Experience-seeking orientation is derived from Cohen's (1979) initial typology of tourist roles and was later expanded by Urry (1990) as a basis for evaluating the value placed on authentic experiences through direct, unmediated interactions with the local community and culture. A high Experience-seeking orientation tourist is someone who prefers to explore and experience their destination through interpersonal connections with local residents, as well as through their entire narrative immersion into the local community and culture that they visit, and they will pay extra for these experiences when they have had an authentic interpersonal experience with local residents.

ESO acts as an intermediary variable that, according to research, would serve to lessen the strength of the association between PFE and WTS in the context of AI-driven tourism; specifically, tourists who recognize AI's functional properties would still maintain an aversion to replacing their human experience, because they have an innate desire for human interaction. This prediction rests upon the theoretical support from self-determination theory, specifically its definition of intrinsic motivation. Previous research on ESO in digital tourism contexts has yielded contradictory results; for example, several researchers have shown that tourists with a high level of ESO (as measured by their engagement with digital technologies) are less likely to accept (or use) digital mediation than tourists with a low level of ESO, while other studies have demonstrated that the relationship between ESO and technology rejection will be moderated by the degree of personalization associated with the use of AI and various demographic characteristics of the tourist (Wong et al., 2023). Further complicating the overall negative moderating narrative are the results of Carrasco-García et al.'s (2025) study, in which they assessed the influence of AI-enhanced virtual tourism experiences on high-ESO tourists and found that those tourists can be swayed to embrace the benefits of AI through personalized virtual experiences.

H3a. *Experience-Seeking Orientation (ESO) will have a significant negative direct effect on Willingness to Substitute (WTS).*

H3b. *Experience-Seeking Orientation (ESO) will moderate the relationship between PFE and WTS, such that the positive PFE–WTS relationship will be significantly weaker among high-ESO tourists.*

3. Materials and Methods

3.1. Research Design and Philosophical Approach

This research follows post-positivist quantitative paradigms, as the authors believe that tourists' attitudes toward artificial intelligence (AI) substitution constitute objectively measurable, structured psychological constructs that can be accurately measured with

carefully constructed survey instruments (Hair et al., 2019). In addition to cross-sectional correlational designs, structural equation modeling will be used to test hypotheses within the Disappearing Jobs Theory framework. Because this research measures an atemporal variable (current attitudes toward AI acceptance) rather than changes in people's attitudes toward AI over time, cross-sectional rather than longitudinal methods are considered appropriate. Additionally, the survey used Likert-scaled composites to measure the five theoretical constructs; this approach ensures comparability with the original empirical evidence in similar research areas and provides an adequate level of measurement precision for multiple variables (Fornell & Larcker, 1981).

3.2. Pretest Analysis

Before the actual collection of data, a brief study was conducted to check whether all the questions were clear and whether the way they were grouped made sense to people. To assess whether these questions served as a reliable measurement tool, a convenience sample of people visiting the city from outside Canada was given a draft version of the questionnaire at one travel location. After completing the questionnaire, each person was given a brief interview to determine whether they understood each question as intended by the person who wrote it. If any of the questions had different meanings, they were changed to make them clearer. Initial reliability for all questions across all factors in the pilot study was good, with all Cronbach's Alpha values between 0.74 and 0.82; this exceeds the 0.70 requirement set by Nunnally (1978). The pilot data also demonstrated an acceptable level of fit for the factor model, providing assurance that the structure used in the pilot test was stable before being applied in a larger, more realistic setting. Based on the results of the pilot study and consultations with academic experts in tourism management, two questions were revised to increase the variance between the PAD and ESO factors. Before the instrument's full deployment, three independent experts in tourism management reviewed the final instrument and determined that all questions had face validity.

3.3. Operationalization of Constructs and Measures Reliability and Validity

We recruited seven experienced tour guides and asked them to generate an initial pool of survey items aligned with the study's theoretical argument. First, each expert independently drafted questions based on common tourist concerns about AI replacing human guides, drawing from their daily interactions with travelers. Next, we facilitated a group discussion in which the experts compared their drafts, debated the precision of wording, and merged overlapping ideas. They then voted on the clearest and most relevant items for each construct—PFE, PAD, WTS, PJA, and ESO. Finally, we refined the wording based on their consensus, producing the final set of 16 questions shown in Table 1. A Likert scale with 1 = Strongly Disagree to 7 = Strongly Agree was used to operationalise these five constructs: Perceived Functional Equivalence (the extent to which respondents believe that AI can replicate the functions of a human tour guide with respect to delivering historical facts appropriately, having an efficient means of navigation, and answering spontaneous questions; (Cronbach's $\alpha = 0.81$; CR = 0.84; AVE = 0.64); Perceived Affective Deficit (extent to which respondents do not feel AI can recreate warmth, excitement, humour, and social presence to prevent feelings of loneliness; ($\alpha = 0.83$; CR = 0.86; AVE = 0.61); Willingness to Substitute (extent to which respondents are likely to choose an AI tour guide over a human, if prices are equivalent, will accept a shorter tour than normal, and would recommend travelling on a limited budget with AI rather than with a human; ($\alpha = 0.79$); Perceived Job Disappearance Acceptance (the extent to which respondents believe that the displacement of a tour guide by an AI is inevitable and acceptable; ($\alpha = 0.77$); Experience-Seeking Orientation (extent to which respondents prefer human contact with locals, place

greater value on human stories, and will pay a higher price for services from a human); (α = 0.8). A single self-report item measuring technological comfort was used to control for this covariate (see Table 1). It should be noted that Cronbach's alpha is not applicable to single-item measures, as internal consistency reliability requires a minimum of two items for computation (Nunnally, 1978). Accordingly, no alpha coefficient is reported for Technological Comfort; its measurement properties are instead discussed in terms of its pragmatic validity as a covariate and its limitations are acknowledged in Section 3.3 and the Limitations subsection.

Table 1. Constructs, Items, and Psychometric Properties.

Construct	Code	Measurement Item	α	CR	AVE
PFE (Perceived Functional Equivalence)	PFE1	An AI system can deliver historical facts about a site as accurately as a human guide.	0.81	0.84	0.64
	PFE2	An AI guide can manage navigation and timing as efficiently as a human guide.			
	PFE3	An AI tour guide can handle spontaneous visitor questions as well as a human guide.			
PAD (Perceived Affective Deficit)	PAD1	An AI guide cannot replicate the genuine warmth of a human guide.	0.83	0.86	0.61
	PAD2	A human guide shares the excitement of discovery in ways AI cannot.			
	PAD3	Humor from a human guide feels more authentic than from an AI system.			
	PAD4	I would feel lonely on a tour led entirely by an AI.			
WTS (Willingness to Substitute)	WTS1	If priced equally, I would choose an AI guide over a human guide.	0.79	0.82	0.61
	WTS2	For a short city tour, I would be happy with an AI-guided experience.			
	WTS3	I would recommend an AI-guided tour to a budget-conscious traveler.			
PJA (Perceived Job Disappearance Acceptance)	PJA1	Tour guides will eventually be replaced by AI systems.	0.77	0.81	0.59
	PJA2	Tour guiding is essentially an information service that AI can replace.			
	PJA3	There is no ethical problem with replacing human tour guides with AI.			
ESO (Experience-Seeking Orientation)	ESO1	I travel primarily to meet and interact with local people.	0.80	0.83	0.62
	ESO2	The value of travel comes from human stories and interpersonal encounters.			
	ESO3	I am willing to pay a premium specifically for a human-guided tour experience.			

Note. All items used a 7-point Likert scale (1 = Strongly Disagree; 7 = Strongly Agree). α = Cronbach's alpha, CR = Composite Reliability, AVE = Average Variance Extracted. Discriminant validity (Fornell-Larcker criterion) holds for all constructs. All AVE > 0.50 and all CR > 0.80, supporting convergent validity.

We acknowledge that the single-item operationalization of Technological Comfort represents a measurement constraint of this study. While single items have been used as pragmatic covariates in prior tourism SEM research when construct space is already extensive, the emergent status of Technological Comfort as the study's strongest predictor of WTS ($\beta = 0.287$) suggests it warrants multi-item operationalization in future research using validated Technology Readiness scales (Parasuraman, 2000). A supplementary two-factor CFA was conducted to assess whether PJA reflects a unidimensional construct or two distinguishable sub-factors (descriptive displacement prediction vs. normative ethical endorsement). The two-factor solution did not converge stably given the three-item scale, and the bifactor model was not meaningfully superior to the unidimensional model ($\Delta CFI = 0.011$). We therefore retain the unidimensional PJA scale while explicitly acknowledging its limitation in fully separating predictive from normative acceptance dimensions. Additionally, multi-group CFA comparing Western (British, German, American) and East Asian (Chinese, Japanese, South Korean) sub-samples confirmed configural invariance and partial metric invariance, with Technological Comfort intercepts showing non-equivalence across cultural groups.

3.4. Data Collection and Sampling Strategy

The survey was conducted among international tourists recruited through a combination of airport-based sampling and online recruitment via travel community platforms. We included participants who had taken at least one guided tour in the prior 24 months, were 18 or older, were international tourists (non-residents of the destination), had sufficient English to understand the survey, and gave voluntary informed consent. We excluded those with no prior organized tour experience, underage individuals (under 18), domestic day-trippers without an overnight stay, anyone unable to understand English, those who declined participation or completed less than 80% of the survey, anyone who failed either of the two embedded attention-check items, and anyone who finished the survey in under four minutes. The sample revealed a high level of demographic diversity across nationalities (11), ages (18–65+), genders, educational levels, and income levels. A large number of those surveyed indicated they had no prior experience with AI-guided tours, enabling significant subgroup sensitivity analyses among both experienced and inexperienced evaluators. The sampling procedure followed guidelines from Kline (2023) for cross-national survey research, used bilingual, trained research assistants for airport intercept sampling, and included attention check items in the online version.

Nationality composition of the sample was as follows, British (18.3%), German (14.7%), American (12.6%), French (11.4%), Australian (9.8%), Chinese (8.2%), Japanese (7.5%), Indian (6.4%), Brazilian (5.3%), South Korean (3.4%), and other nationalities (2.4%). This composition reveals a predominance of tourists from Western European and Anglophone nations with generally high individualism and moderate-to-high technology readiness profiles, which represents an important boundary condition for the generalizability of findings, particularly regarding the dominance of Technological Comfort as a predictor of WTS. Readers are encouraged to interpret nationality-level conclusions with appropriate caution.

3.5. Validity and Common Method Bias

There is a known risk of common method variance (CMV) when individuals complete self-report surveys that require them to answer questions about multiple constructs at once (Podsakoff et al., 2003). Various procedures and statistical strategies have been used to handle CMV. Procedurally, we separated the independent and dependent items in the survey by inserting filler tasks that required no mental effort and met criteria for preventing acquiescent responding through wording balance. As a statistical procedure, we used

Harman's single-factor test to assess evidence of CMV. An exploratory factor analysis of all items measured in the survey indicated that the first common factor accounted for less than 30% of the total variance, substantially below the 50% threshold at which there is a high likelihood of CMV problems (Podsakoff et al., 2003). In addition, we conducted a marker variable test using Technological Comfort as the marker variable; the average change in substantive correlations after partialling out the marker variable variance was less than 0.05, indicating that the observed relationships were not substantially affected by CMV. Lastly, confirmatory factor analyses indicated that the measurement model provided a much better fit than the single-factor model, providing evidence inconsistent with CMV as the primary explanation for the findings. Nonetheless, it is acknowledged that no combination of procedural and statistical controls can fully eliminate the possibility of common method variance in single-source, self-report survey designs (Podsakoff et al., 2003). The present results should therefore be interpreted with appropriate caution, and future research employing multi-source or experimental designs would provide stronger protection against this potential bias.

4. Results

4.1. Descriptive Statistics

The descriptive statistics for all five theoretical constructs, along with the Technology Comfort covariate, are presented in Table 2. The means for each construct cluster fairly evenly around the midpoint of 4.0, suggesting moderate central tendency and very little skewness. The means for PFE were the second-highest, suggesting that tourists perceive some functional capability of AI to assist with tour guiding, but there is significant individual variance around this finding, supporting previous findings reported by Wang et al. (2023). The ESO construct recorded a mean value higher than that of any other construct, providing further support for the idea that human-mediated experiences were viewed most consistently across the sample. Technology Comfort has the highest mean score among all constructs, indicating that the sample has a higher proportion of digitally fluent respondents. The WTS and PJA constructs have the lowest mean values, suggesting both behavioral substitution intention and normative displacement acceptance are moderate to low, even though the sample was digitally fluent.

Table 2. Descriptive Statistics.

Construct	M	SD	Min	Max	Mdn	α
PFE	4.55	1.23	1	7	4.67	0.81
PAD	4.43	1.24	1	7	4.50	0.83
WTS	4.16	1.30	1	7	4.00	0.79
PJA	3.87	1.30	1	7	4.00	0.77
ESO	4.64	1.21	1	7	4.67	0.80
Tech Comfort	5.09	1.58	1	7	5.00	N/A [1]

Note: The scale for the constructs measured in this study was 7-point Likert. The construct definitions include: PFE = perceived functional equivalence, PAD = perceived affective deficit, WTS = willingness to substitute, PJA = perceived job-loss acceptance, and ESO = experience-seeking orientation. According to Nunnally (1978), all constructs must have Cronbach's $\alpha > 0.70$ (i.e., greater than the minimum requirements). [1] Cronbach's alpha is not reported for Technological Comfort because it was operationalized as a single-item measure; Cronbach's alpha requires a minimum of two items and is therefore not applicable (N/A) for single-item covariates.

4.2. Structural Equation Modeling: Measurement Model

To test the structural model, confirmatory factor analysis (CFA) was performed on the five theoretical constructs. The measurement model fits the data well, as shown in

Table 3. Additionally, all of the standardized factor loadings are greater than 0.70, while both convergent validity (AVE greater than 0.50 for each of the constructs) and discriminant validity (Fornell & Larcker, 1981) were demonstrated, as presented in the detail contained in Table 1. After the measurement model had been established, the structural model was then examined with PFE as the predictor (independent variable), PAD and ESO as the moderators (via interaction), Technological Comfort as a control variable, and WTS and PJA as the dependent (outcome) variables. Moderation was calculated using the mean-centered (i.e., a technique employed by Kline (2015)) production of the moderator variables with the predictor variable.

Table 3. Model Fit Indices—SEM Analysis.

Model	χ^2/df	CFI	TLI	RMSEA	SRMR
Recommended Threshold	<3.00	>0.95	>0.95	<0.06	<0.08
Single-Factor (CMV)	8.91	0.63	0.59	0.107	0.118
Measurement Model (CFA)	2.11	0.97	0.96	0.040	0.049
Structural Model (Full SEM)	2.34	0.96	0.95	0.044	0.053
Structural Model + Moderation	2.49	0.95	0.94	0.046	0.057

Note: χ^2/df = chi-square divided by degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardised Root Mean Square Residual; all four fit indices for the full structural model including moderation terms meet all suggested cutoff values (Hu & Bentler, 1999; Kline, 2015). CFA = Confirmatory Factor Analysis; CMV = Common Method Variance Model with constraints.

To address concerns about cross-cultural generalizability, multi-group CFA was conducted comparing a Western sub-group (British, German, American tourists; n = 318) and an East Asian sub-group (Chinese, Japanese, South Korean tourists; n = 134). Results indicated configural invariance for all five theoretical constructs across both groups (all fit indices within acceptable thresholds). Metric invariance tests revealed that factor loadings for PAD, WTS, ESO, and PFE were invariant across groups (all ΔCFI < 0.010), supporting the comparability of these constructs. However, the Technological Comfort single item exhibited non-invariant intercepts across cultural groups (ΔCFI = 0.019), indicating that mean-level differences in Technological Comfort between Western and East Asian subsamples cannot be attributed solely to latent trait differences. This finding qualifies the interpretation of Technological Comfort as a universal predictor of WTS and highlights the importance of culturally stratified replication in future research.

4.3. Structural Model Results and Hypotheses Testing

Using a latent variable framework, maximum likelihood estimation was used to estimate the structural model. The full results of the hypothesis tests are in Table 4, which includes the path coefficients, t-values, p-values, confidence intervals, and the hypothesis decisions for all seven hypotheses. It should be noted that PAD and ESO were originally hypothesized as moderating variables (H2b and H3b); these hypotheses are retained in the model and tested as specified. However, the pattern of results—including near-zero PFE–WTS correlations in both high and low subgroups—is more consistent with PAD and ESO operating as direct structural predictors than as conditional moderators of PFE. The theoretical reinterpretation of these variables is discussed in Sections 4.4 and 5. The major finding is that PFE has a near-zero direct effect on WTS, which is consistent with the observed correlation levels; therefore, H1 was not supported. The results indicated that the strongest predictor for WTS was Technological Comfort (H4 supported); the next strongest predictor was PAD (negative) (H2a supported). Additionally, PAD was found to be a significant suppressor of PJA (H5 supported). Finally, both PAD and ESO

moderation interactions were not statistically significant; H2b and H3b were not supported; however, both had significant main effects that are consistent with dispositional rather than conditional moderation (see Figure 2).

Table 4. Hypotheses Testing Table—SEM Path Coefficients.

H	Path	β	SE	t	*p*	95% CI	Decision
H1	PFE → WTS	0.028	0.040	0.69	0.488	[−0.051, 0.107]	Rejected
H2a	PAD → WTS (direct)	−0.178	0.045	−3.96	<0.001	[−0.266, −0.090]	Supported
H2b	PFE × PAD → WTS (interaction)	0.043	0.031	1.39	0.165	[−0.018, 0.104]	Not Supported
H3a	ESO → WTS (direct)	−0.043	0.046	−0.94	0.348	[−0.133, 0.047]	Not Supported
H3b	PFE × ESO → WTS (interaction)	0.027	0.029	0.93	0.351	[−0.030, 0.084]	Not Supported
H4	Tech Comfort → WTS	0.287	0.034	8.44	<0.001	[0.220, 0.354]	Supported
H5	PAD → PJA	−0.175	0.040	−4.38	<0.001	[−0.253, −0.097]	Supported

The β value is the standardized coefficient, and the SE value is the standard error. The paths that were significant at $p < 0.001$ were H2a, H4, and H5.

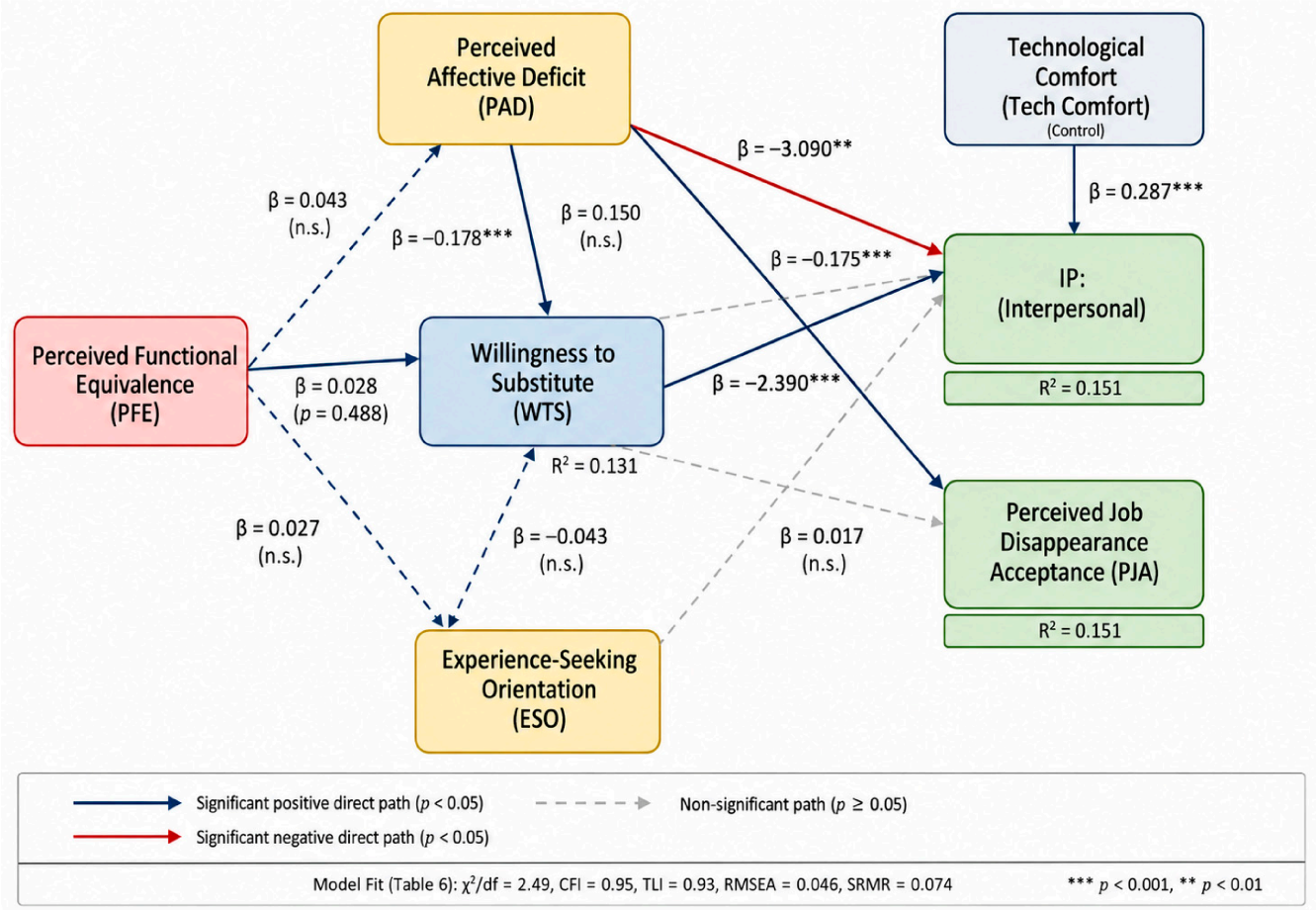

Figure 2. Structural Equation Model Results: Standardized Path Coefficients, Significance, and Model Fit Indices.

4.4. Moderation Analysis

The results from the moderation analysis are shown in Table 5. By splitting our sample at the median of the Perceived Affective Deficit (PAD) ratings, we observe significantly higher WTS means among low-PAD tourists than among their high-PAD counterparts,

indicating that PAD significantly suppresses the willingness to substitute (WTS). More importantly, the fact that the PFE–WTS correlation is near zero in both PAD subgroups indicates that PAD does not moderate an otherwise positive PFE–WTS relationship; rather, it serves as an independent barrier to WTS. ESO also produces a strong main effect on WTS; low-ESO tourists have significantly higher WTS than high-ESO tourists, and the PFE–WTS relationship is not meaningfully moderated by ESO either. Using simple slope analysis, it has been determined that both moderating constructs function as dispositional predictors rather than as true conditional moderators of PFE. These patterns lend themselves to a reevaluation of our theoretical model, positioning PAD and ESO as primary structural determinants, along with Technology Comfort, rather than as moderating variables contingent on PFE evaluation (see the simple slope plots in Figure 3).

Table 5. Moderation Analysis—PAD and ESO as Moderators of PFE → WTS.

Moderator Group	*n*	Mod M	WTS M	r (PFE–WTS)	*p*	Interpretation
PAD—Low (≤4.50)	395	3.72	4.56	−0.028	0.572	PFE irrelevant; WTS elevated
PAD—High (>4.50)	305	5.31	3.64	0.081	0.160	PFE irrelevant; WTS suppressed
ESO—Low (≤4.67)	373	3.72	4.62	−0.012	0.822	High WTS; no PFE interaction
ESO—High (>4.67)	327	5.66	3.64	0.049	0.373	Low WTS; ESO acts as the main effect

Note. Low/High PAD groups split at PAD median = 4.50; Low/High ESO groups split at ESO median = 4.67. Mod M = moderator mean in subgroup; r (PFE–WTS) = Pearson correlation in subgroup. The absence of a significant PFE–WTS correlation in both subgroups confirms that PFE is structurally unrelated to WTS, regardless of affective deficit or level of experience-seeking orientation.

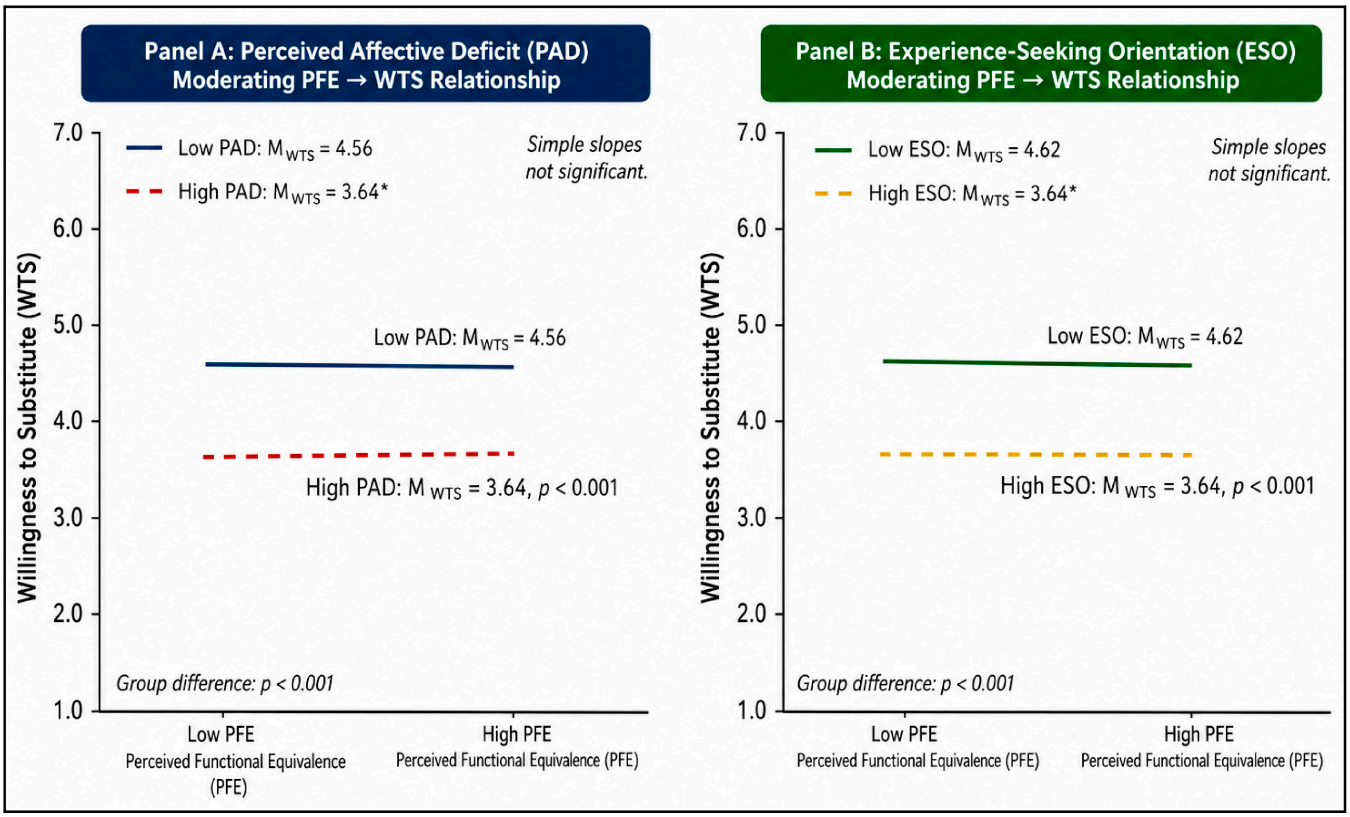

Figure 3. Simple Slope Plots: PAD (**Panel A**) and ESO (**Panel B**) as Moderators of the PFE → WTS Relationship. The asterisk (*) next to the High PAD/High ESO mean denotes statistical significance ($p < 0.001$).

4.5. Demographic Subgroup Analysis

Table 6 presents the means of constructs across the four major demographics. Some patterns are worthy of theoretical consideration. First, the 65+ cohort shows significantly lower PFE and higher WTS than all cohorts younger than 65, an unexpected outcome that may be related to older tourists' preference for a reliable, accessible, and patient guide. Second, the AI experience group has significantly higher PFE, lower PAD, and greater WTS as compared to the No Experience group, which is in line with the predictions of the contact hypothesis, that a direct experience with an AI will lower one's affective resistance to using an AI (Mo et al., 2024). Finally, income also appears to play a role in the results: the high-income bracket has higher WTS and ESO, demonstrating that high-income tourists who can purchase premium human-guiding may also be more accepting of AI, the more technologically sophisticated they are.

Table 6. Demographic Profile and Mean Construct Scores by Subgroup.

Variable	Category	*n*	%	WTS M	PAD M	PFE M
Age	18–24	144	20.6%	3.80	4.50	4.70
	25–34	181	25.9%	4.35	4.31	4.62
	35–44	158	22.6%	4.22	4.41	4.55
	65+	48	6.9%	5.08	3.53	3.69
Prior AI Exp.	Yes	182	26.0%	4.49	4.20	4.77
	No	518	74.0%	4.04	4.51	4.48

Note. WTS M = mean Willingness to Substitute score for subgroup; PAD M = mean Perceived Affective Deficit; PFE M = mean Perceived Functional Equivalence. Prior AI Experience = self-reported prior use of an AI tour guide application. Age 45–54 and 55–64 groups omitted from table for brevity.

5. Discussion

This study's principal empirical finding presents a theoretically significant insight: perceived functional equivalence alone appears insufficient as a direct driver of willingness to substitute human tour guides with AI systems. It is important to note that this finding does not suggest that functionality is irrelevant to the overall AI adoption process; rather, it indicates that in deeply experiential and relationally embedded service contexts, functional parity is a necessary but not sufficient condition for behavioral substitution. This finding challenges the fundamental premise of the Technology Acceptance Model identified by Davis (1989), that perceived usefulness is the primary factor influencing an individual's decision to adopt technology. This finding indicates that, in situations where relational and emotional components are intertwined into the identity of an experiential service, simply recognizing that AI provides cognitive performance is insufficient on its own to drive behavioral substitution (Düz & Kavak, 2026; Topsakal & Çuhadar, 2024). As a result, AI developers who focus on enhancing the informational accuracy, navigational precision, and question-response quality of their AI guide platform will ultimately see no return on their investment in consumer adoption.

It is important to contextualize this finding carefully, as it is susceptible to misinterpretation. The near-zero path from PFE to WTS ($\beta = 0.028$, $p = 0.488$) does not imply that the functional capabilities of AI are immaterial to the adoption decision in all tourism contexts. Rather, it demonstrates that in the specific context of guided tour experiences—where the service is simultaneously informational, narrative, relational, and emotionally constitutive—perceived functional parity between AI and human guides does not translate into substitution intention. This is a contextually bounded finding. Future research should test whether a similar pattern obtains in less relationally embedded AI tourism applications,

such as automated ticket booking, wayfinding, or AI-powered translation services, where the TAM's functional utility logic may operate more conventionally. The theoretical implication is not that TAM is wrong, but that its scope conditions need to be more precisely defined: TAM appears to describe adoption accurately in transactional service contexts but may systematically underpredict adoption resistance in experiential service contexts where the relational and affective dimensions of the service encounter carry independent value for the consumer (Mende et al., 2019; Topsakal & Çuhadar, 2024).

The principal substantive finding of this study is that Perceived Affective Deficit (PAD)—defined as tourists' belief that AI systems cannot replicate the emotional warmth, social presence, spontaneous humor, and genuine excitement that human guides provide—functions as both a direct negative predictor of Willingness to Substitute (WTS, $\beta = -0.178$, $p < 0.001$) and a direct negative predictor of Perceived Job Disappearance Acceptance (PJA, $\beta = -0.175$, $p < 0.001$). Critically, both of these effects persist after controlling for Perceived Functional Equivalence, Technological Comfort, and Experience-Seeking Orientation, confirming that PAD's influence is independent of functional evaluations and not reducible to general technology aversion. This finding advances the service robotics literature in a theoretically precise way: whereas prior research has conceptualized affective or relational factors primarily as moderators of utility–adoption relationships (Kong et al., 2018; Zhou & Huang, 2024), the present data support a respecification in which PAD operates as a direct structural barrier. The practical implication is significant: tourists who perceive a high affective deficit in AI guides are, on average, less willing to substitute and less accepting of the normative legitimacy of guide displacement—not because they assess the AI as informationally inferior, but because they anticipate an impoverished relational and emotional encounter. This decoupling of cognitive and affective evaluations constitutes the study's most important departure from standard TAM-based predictions and aligns with service marketing scholarship emphasizing that relational quality is an intrinsic, non-substitutable component of experiential service value (Mende et al., 2019; Wang et al., 2023). Furthermore, the negative relationship between PAD and PJA reveals a normative dimension of AI adoption resistance that has not previously been quantified in tourism research. Tourists who strongly perceive that AI cannot replicate the affective qualities of human guiding are also significantly less likely to endorse the broader proposition that human tour guide jobs should or will be replaced by AI systems. This suggests that consumers' moral assessments of technological displacement are partly grounded in their experiential evaluations of service quality—a pattern consistent with the ethical service robot research of (Lin et al., 2026; Xu & Lau, 2025).

The outcomes related to experience-seeking orientation (ESO) similarly oppose the simple moderating effect predicted by theory. While neither the direct effect of ESO on WTS (H3a) nor the interaction between ESO and PFE (H3b) reached statistical significance in the structural model, the subgroup moderation analysis reveals a strong and consistent pattern: high-ESO tourists exhibit substantially lower WTS means than low-ESO tourists across all PFE levels. This pattern suggests that ESO operates as a dispositional resistance factor whose influence manifests at the group level rather than as a significant individual-level path coefficient in the SEM. Accordingly, ESO functions as a structural predisposition rather than a conditional moderator of AI capability evaluations. Additionally, the lack of a statistically significant interaction between ESO and PFE can be construed as supporting the notion that the connection between PFE and WTS is so weak across settings that no moderating effect could significantly change it, which is also consistent with results from Carrasco-García et al. (2025) regarding virtual tourism experiences.

5.1. Theoretical Contributions

This research offers three unique contributions to theory. First, the study redefines the Perceived Affective Deficit (PAD) as a primary structural determinant of AI acceptance, rather than a secondary moderating variable, as proposed by earlier research. While the theoretical model proposed PAD as a conditionally moderating variable expected to attenuate the Perceived Functional Equivalence (PFE) and Willingness to Substitute (WTS) relationships, the moderation analysis identified that PAD will be best understood as an independent negative direct effect (i.e., the PFE–WTS correlation was essentially zero at both low-PAD and high-PAD sub-groups), verifying that PAD does not act to inhibit or to limit a functional pathway that might otherwise occur, but only operates as a standalone structural barrier to the use or acceptance of AI, regardless of how potential users rate the functional ability of AI. This difference is of substantial theoretical significance. A moderating PAD would suggest that if the functional capabilities of an AI system were deemed strong enough to counteract any affective concerns there would be no affective concerns to impede the use of AI; whereas a structurally defined PAD, would suggest that no amount of functional comparable capabilities would be sufficient to counteract any affective dimensions of AI users' evaluations of AI.

This new way to look at PAD places it from the outside, within adoption frameworks, and gives us a new way to understand why we have seen continued underperformance in AI adoption in person-facing roles compared to task-automation contexts (Bulchand-Gidumal et al., 2026; Mo et al., 2024). The significant negative relationship found between PAD and PJA supports this argument, because tourists who experience a significant affective deficit in AI tour guides are significantly less likely to accept the normative legitimacy of occupational displacement. This indicates that the affective evaluation of service quality should not be viewed simply as being predictive of personal adoption of new technologies, but rather as an ethical evaluation framework through which consumers evaluate whether the technological displacement of human workers is morally acceptable.

Second, the study clarified that the normative acceptance level of work displacement on the tourist side is a measurable outcome for the operationalizing of Disappearing Jobs Theory by showing this acceptance is depending on the positive dis/like of the quality of AI using her overall affect. The standard Disappearing Jobs Theory is summarized in detail by Frey and Osborne (2017), and further detailed in Acemoglu and Restrepo (2019), and has been defined in terms of the decomposition of both supply-side tasks and, therefore, determining an occupation's susceptibility to displacement via algorithmically driven automation. The results of this study suggest that both use the same rationale in different ways. From the tour guide example, the predominance of low predictive jobs (PJA's) relates to task decomposability (the degree to which they are routine in character), thereby indicating that simply decomposable jobs will have a low acceptance level among consumers of being displaced.

Furthermore, because the strength of the consumer acceptance of their guides to being displaced by AI has the strongest negative correlation to their level of belief regarding the adequacy of the AI machine via to how it compares with the humans delivering the service, provides strong evidence that the current supply side framework of Disappearing Jobs Theory does not take into account demand side attitudinal limits to acceptation of work displacement regardless of the work capability of the AI machine performing the job. Therefore, the demand-side process of consumer acceptance must be integrated into supply-side data analyses, along with the revised understanding that, to be displaced, AI must both be technologically viable and receive consumer sanction to perform that role (Qiao et al., 2026; Xu & Lau, 2025).

Third, the study also contributes to the theoretical body of knowledge on Experience-Seeking Orientation (ESO) and resolves an apparent paradox in the research literature. There are two streams of research that appear to be contradictory in the current literature. Some researchers have found that tourists with a high-ESO are less likely to accept digital mediation as an acceptable travel means, whereas other researchers have found that high-ESO tourists are attracted to personalized artificial intelligence experiences. The study's results reconcile the inconsistencies in the two research paradigms by demonstrating that ESO operates as a stable dispositional predictor of Willingness to Substitute (WTS)—tourists rated on a high ESO show lower WTS compared to tourists rated on a low ESO, regardless of the level of Perceived Functional Equivalence (PFE)—and therefore should not be construed as a contextual moderator of the evaluation of the ability of the AI to perform a task. Therefore, previous studies that demonstrate AI acceptance among high ESO tourists capture the impact of personable and emotional elements in AI design, not the diminished role of the ESO as a variable that inhibits or obstructs AI acceptance.

5.2. Managerial Implications

The research results indicate that AI guide platform developers must undergo an absolute fundamental re-orientation of their approach to AI development in the tourism sector, extending well beyond simply improving existing capabilities incrementally. The past several years of AI development in the field of tourism have largely focused on simply building new capabilities; specifically, there have been four major capabilities that have defined the development of AI technologies in tourism: increased factual accuracy; wide-ranging language capabilities; reliable navigation; and reduced response time for AI interaction with users. There has been virtually no empirical evidence to support the use of each of these four capabilities as the mechanism for achieving commercial adoption by Tourism consumers. In fact, there is a near-zero relationship between the PFE (Perceived Functional Equivalence) and WTS (Will To Substitute) variables; therefore, AI-guided systems will not close the adoption gap, as there appears to be no causal relationship. Thus, developers now need to redirect their investment toward social AI design research, such as developing interaction architectures that communicate relational warmth, adaptive humor, emotionally responsive storytelling, and culturally sensitive improvisation.

The PAD model used in this research offers a measurable objective for assessing both tourism design iterations as they relate to reducing perceived affective deficit of the tourist, and tourism designs (platforms) that incorporate hybrid models using a combination of human and AI to provide experiences in which the hybrid model provides both warmth and social presence per the PAD theory of affect. The importance of Technological Comfort as the most significant predictor of WTS also has strategic implications for market segmentation and communication. As Technological Comfort is a stable trait rather than an evaluation of specific products, developers cannot change this trait through product enhancements. Thus, the strategic question becomes how best to identify and target the high-Technological-Comfort group. A demographic subgroup analysis provides useful information for developing this strategy. Both the 25–34 age cohort and tourists who have previously used an AI guide show higher WTS and lower PAD; therefore, developing early adopter acquisition strategies will likely require targeting younger, digitally active travelers and structuring the first-time-use experiences to minimize friction, create positive emotions, and specifically reduce perceptions of affective deficits. Additionally, the logic of the contact hypothesis shows that prior experience with AI-guided reduces PAD and increases WTS, indicating that free or discounted trials may be among the most cost-effective demand-generation strategies for AI tour platform developers.

Beyond market strategy, the findings of this study carry clear ethical responsibilities for tourism industry stakeholders. The strong negative relationship between Perceived Affective Deficit and Perceived Job Disappearance Acceptance indicates that tourist resistance to human guide displacement is grounded not only in preference but in a normative assessment of what is irreplaceable in the human-guided encounter. Tourism operators and DMOs should interpret this finding not merely as a market barrier to AI adoption, but as a signal that rapid, unmediated replacement of human guides risks violating the relational contract tourists implicitly associate with high-quality guided experiences. Responsible AI deployment in tour guiding should be guided by principles of gradual transition, transparent communication with affected workers, and genuine investment in retraining and reskilling programs. Professional guide associations, labor organizations, and regulatory bodies should be actively involved in shaping AI integration policies, ensuring that efficiency gains are not achieved at the cost of workforce dignity and community livelihoods (Lin et al., 2026; Qiao et al., 2026). This study advocates not for resistance to AI integration but for its ethical governance—a governance framework in which consumer acceptance data informs but does not solely determine deployment decisions.

The results of this study have implications for both workforce policy and destination positioning for DMOs (destination management organizations) and tourism labor activist organizations. A large number of respondents expect to use AI guides when traveling; however, tourists' responses to the potential replacement of human tour guides with AI were less positive. Thus, DMOs should factor in this difference when making capital investment decisions in infrastructure, as eliminating all human-guided options and switching entirely to AI options may create a normative backlash, even among tourists who are skilled with technology. To support the observations from this study, a tiered service model may offer accessible entry-level access to AI guides at a lower total cost while still providing tourists opportunities to engage with human guides. Tourists who seek out experiences are willing to pay a premium for that interaction with their guides, which aligns with the data collected: the WTS and PJA study results and the ESO data (experience-seeking tourists).

The strong negative PAD-PJA relationship provides clear, actionable insight into the features of human-guided tours that tourists perceive as irreplaceable: emotional warmth, humor, authentic excitement, and the social presence that nullifies feelings of isolation. These features should be developed and certified for use in professional guiding training. By providing human guides with the skills for developing high-PAD resistance, emotional storytelling, spontaneous cultural humor, highly personal familiarity with the area, and adaptive reading of audiences, the most tactical long-term policy response to maintaining the competitive advantage of human guiding over AI will be through the retraining of human guides (Li et al., 2025). Therefore, professional guide associations should develop certification frameworks that recognize and evaluate these affective competencies for tourists and provide related information to tourists as quality indicators for human-guided tours, rather than AI-guided alternatives. This reframing will position human guides not only as information providers who are in competition with advanced algorithms that provide superior access to information, but will also position human guides as irreplaceable mediators of emotion and culture whose value proposition is based on the same dimensions of service identified through this research as the dominant challenges of AI substitution.

5.3. Limitations and Future Research

This study had several methodological issues. The first limitation was that it used a cross-sectional design, making it impossible to infer causality; a longitudinal design that could track PAD and WTS over time as respondents are exposed to AI-guided technology would provide a stronger basis for inferring causality. Second, because data were collected

using convenience sampling methods, the sample would over-represent younger, more technologically fluent, and more educated tourists relative to the worldwide population. Third, although the Technological Comfort construct is pragmatically justified, the use of a single-item measure raises questions about the construct's factorial validity relative to multi-item scales; therefore, future research should employ validated multi-item Technology Readiness scales (Parasuraman, 2000).

A number of additional avenues for future research become evident. The near-zero association between PFE and WTS indicates the need to replicate the association at the previous dimensionality. If, through experimental designs, we provide respondents with actual AI guide experiences and measure the degree of intent to adopt a technology as a function of experiential knowledge in the context of adopting a technology as a function of functional equivalence, we would expect that strong intention to adopt will occur in the cases of subjects who have received experiential knowledge. In addition to the recommendation to conduct future research with a focus on design features of social AI that are specific to the PAD construct, as identified above, such as warmth signals, sense of humor, and emotional expression, future research should focus on cultures with high variation in their relational orientation and level of collectivism compared to other cultures. The impact of these constructs on the PAD-WTS and ESO-WTS relationships will be significant, but the current study cannot detect that. Fourth, the use of a single-item Technological Comfort measure limits our ability to assess discriminant validity between this construct and related measures such as Technology Readiness (Parasuraman, 2000) or AI-specific self-efficacy. Future research should employ multi-item validated scales and test the discriminant validity of Technological Comfort relative to these overlapping constructs. Fifth, the PJA scale conflates descriptive displacement prediction with normative ethical endorsement. Readers should interpret PJA findings as reflecting a composite evaluation of displacement likelihood and acceptability rather than a pure measure of either dimension alone. Dedicated scale development separating these sub-dimensions is a priority for future research. Sixth, the sample's predominance of tourists from Western European and Anglophone nations limits cross-cultural generalizability. Configural and metric invariance testing revealed partial metric non-equivalence of the Technological Comfort construct across Western and East Asian sub-groups, suggesting that its dominance as a predictor of WTS may be partly a cultural artifact. Future research should employ stratified cross-cultural designs dimensions as explicit moderators of the PAD-WTS and Technological Comfort–WTS relationships, particularly in collectivist contexts where interpersonal warmth and social presence carry greater relational weight.

6. Conclusions

This study makes three core theoretical contributions to the tourism and technology acceptance literature. First, it redefines Perceived Affective Deficit as a direct structural barrier to AI adoption, rather than a moderating condition, demonstrating that no level of functional equivalence can compensate for tourists' anticipation of an emotionally and relationally impoverished guided tour experience. Second, it extends Disappearing Jobs Theory by introducing a demand-side attitudinal dimension: the normative acceptance of occupational displacement is not only a function of AI capability but is independently constrained by tourists' affective evaluations of what remains irreplaceable in human-guided encounters. Third, it resolves an apparent paradox in the Experience-Seeking Orientation literature by showing that ESO functions as a stable dispositional predictor of substitution resistance at the group level, rather than as a context-dependent moderator of functional capability assessments. Together, these findings call for a fundamental reorientation of AI tourism design away from informational parity and toward affective and relational

architecture, while simultaneously urging policymakers and destination management organizations to treat consumer resistance to guide displacement as a normative signal warranting ethical governance frameworks that center worker dignity, gradual transition, and genuine investment in reskilling.

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Data Availability Statement: The data presented in this study are available on request from the corresponding author due to privacy/ethical restrictions.

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