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Preliminary Assessment of the Determinants Influencing Behavioral Intention to Use Virtual Reality in Dark Tourism in Malaysia

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Abstract. This study presents an exploratory evaluation of consumer readiness for immersive technology within Malaysia's niche heritage sector. Specifically, it validates the linguistic clarity, operational structure, and psychometric reliability of a research instrument designed to measure behavioral intentions toward using Virtual Reality (VR) in dark tourism settings. While overarching national frameworks emphasize smart tourism modernization, integrating digital platforms into sensitive, tragedy-associated commemorative sites requires careful pre-adoption scrutiny. To bridge this gap, the study adapts the Experiential Technology Acceptance Model (ETAM) framework, examining how traditional cognitive indicators—Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—intersect with affective dimensions, including Perceived Enjoyment (PE) and Perceived Immersion (PI). Data collection was executed via a controlled, scenario-based online survey involving 30 Malaysian domestic tourists who were conceptually familiar with VR interfaces. Statistical analysis using Cronbach's Alpha (α) through SPSS revealed exceptional structural reliability across all constructs, with values well above the recommended threshold of 0.70. The reliability scores were 0.953 for Perceived Usefulness (PU), 0.975 for Perceived Ease of Use (PEOU), 0.973 for Perceived Enjoyment (PE), 0.974 for Perceived Immersion (PI), and 0.959 for Behavioral Intention (BI). Theoretically, this study confirms that the adapted ETAM framework is structurally sound for culturally sensitive environments. Practically, the validated instrument provides a dependable baseline for destination developers seeking to align immersive digital experiences with Malaysia's National Tourism Policy 2020–2030 and Smart Tourism Blueprint 2023–2027.

Keywords: Virtual Reality (VR); Dark Tourism; Experiential Technology Acceptance Model (ETAM); Reliability Analysis

Introduction

This paper establishes the operational foundation for a preliminary assessment of Virtual Reality (VR) adoption within the unique domain of dark tourism in Malaysia, focusing specifically on the structural and psychometric validation of a newly adapted research instrument through a dedicated pilot study. As global travel ecosystems undergo aggressive digital transformations, the deployment of immersive platforms is increasingly recognized as a vital mechanism to revolutionize heritage interpretation, visitor interaction, and historical storytelling (Beck et al., 2022; Tussyadiah et al., 2018). Yet, while mainstream commercial, leisure, and hospitality attractions have rapidly absorbed advanced digital experience designs, niche heritage sectors remain noticeably left behind. Memorial parks, wartime heritage sites, and tragedy-associated locations across Malaysia continue to rely almost exclusively on conventional, passive, and static interpretive tools (Musa & Shariff, 2022).

To systematically explore the feasibility and consumer acceptance of digital interventions within this sensitive space, this study utilizes the Experiential Technology Acceptance Model (ETAM) framework (Huang et al., 2023). This framework expands traditional technology acceptance logic (Davis, 1989) by integrating core functional cognitive determinants—Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)—with affective experiential dimensions, namely Perceived Enjoyment (PE) and Perceived Immersion (PI), to project prospective Behavioral Intention (BI) (Park & Kim, 2022; Saad et al., 2024). Because full-scale field execution across a diverse national population carries immense logistical and financial risk, conducting a localized pilot validation is a critical prerequisite. Therefore, the primary objective of this introductory phase is the diagnostic validation of this adapted measurement scale, ensuring absolute linguistic clarity, cultural appropriateness,

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Original Article

and psychometric reliability among domestic Malaysian travelers before executing full structural equation modeling (Hair et al., 2022).

The tourism sector stands as an essential pillar of Malaysia's national economy, contributing heavily to socio-economic growth, employment generation, and regional development. Following the post-pandemic recovery period, the nation recorded approximately 20.14 million international arrivals generating RM71.3 billion in revenue, with the broader sector accounting for roughly 15.3% of the national Gross Domestic Product (GDP) (Tourism Malaysia, 2024). Despite these robust benchmarks, a core structural vulnerability persists: Malaysia's tourism portfolio remains heavily anchored to conventional, repetitive leisure offerings such as shopping, beach resorts, eco-tourism, and culinary travel. In an increasingly competitive Southeast Asian market where neighboring countries offer identical products, diversification into experience-driven, unique niche segments has shifted from a luxury to an operational necessity. Modern domestic and international travelers actively bypass passive consumption; instead, they seek highly authentic, emotionally compelling, and educationally enriching encounters that deliver deep cultural resonance (Hall et al., 2023; Pine & Gilmore, 2020).

Concurrently, dark tourism—the act of traveling to sites historically associated with tragedy, conflict, suffering, or collective remembrance—has gained substantial international traction as a potent vector for experiential education and cultural preservation (Sharpley & Stone, 2019; Stone, 2020). Globally recognized benchmarks like the Hiroshima Peace Memorial or the Auschwitz-Birkenau Memorial demonstrate how places of tragedy simultaneously operate as vital spaces for historical learning, moral reflection, and cultural heritage preservation (Stone, 2022). When curated ethically and respectfully, dark tourism sites do not exploit morbid curiosity; rather, they transform past suffering into an empathetic educational experience that strengthens national identity and historical consciousness (Light, 2024).

Malaysia possesses an extensive, highly significant portfolio of dark heritage locations, including World War II battlegrounds, colonial-era prisons, and natural disaster sites. Landmarks such as the Sandakan Death March Memorial and the Kundasang War Memorial in Sabah, alongside the Penang Tsunami Memorial, preserve critical narratives of human resilience, tragedy, and national history (Musa & Shariff, 2022; Wong & Hamzah, 2023). However, these locations are drastically underutilized and underpromoted within both domestic and international travel markets. A major cause of this stagnation is the severe lack of interactive interpretation. The majority of Malaysian dark heritage sites rely exclusively on traditional, analog media—such as weather-worn text panels, static photo displays, or occasional guided walks—which fail to engage modern, digitally native audiences (Musa & Shariff, 2022). Furthermore, deep-seated cultural sensitivities surrounding the public discussion of death, conflict, and historical trauma create structural hesitation, frequently limiting open promotion and public engagement (tom Dieck & Jung, 2018).

Immersive digital innovations, specifically Virtual Reality (VR), provide a strategic bridge across these cultural and communicative divides. By simulating computer-generated, three-dimensional spaces, VR allows users to experience reconstructed historical environments and story-driven narratives from a first-person perspective, generating a profound sense of psychological presence and emotional investment (Radianti et al., 2020). Within an emotionally charged sector like dark tourism, VR acts as a controlled, non-invasive vehicle for storytelling. It enables visitors to connect with sensitive histories through symbolic imagery, archival voices, and spatial reenactments without physically altering fragile landscapes or confronting emotionally overwhelming displays (Han et al., 2022; Loureiro et al., 2021). Furthermore, younger Malaysian generations are heavily influenced by interactive media, making traditional history books or silent exhibitions feel disconnected (Liew & Chan, 2024). Incorporating VR into dark heritage landscapes holds immense potential to modernize national history education, making it accessible, emotionally resonant, and engaging for modern societies.

This research direction directly advances the strategic mandates of the Malaysian government. The National Tourism Policy 2020–2030 and the Smart Tourism Blueprint 2023–2027 explicitly emphasize smart technology deployment, digital innovation, and experience curation as core national priorities to restore global tourism competitiveness (Tourism Malaysia, 2023). However, executing mass technological updates across nationwide heritage sites without empirical data regarding user readiness introduces substantial financial and operational risks. Because VR remains an emerging technology within the Malaysian tourist market, understanding how local consumers cognitively evaluate its usefulness and emotionally experience its immersive qualities is an absolute prerequisite. Therefore, conducting a targeted pilot study to validate an Experiential Technology Acceptance Model (ETAM) instrument provides the critical exploratory foundation needed to guide responsible, data-backed digital heritage investments in Malaysia (Huang et al., 2023; Rahmat et al., 2023).

Despite the strategic value of smart technology integration, the actual deployment of immersive tools across Malaysian heritage and memorial locations remains deeply fragmented and largely unexamined. According to tracking reports from the Malaysia Digital Economy Corporation, fewer than 15% of regional

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https://ijroms.com
Original Article

tourism operators have integrated advanced digital interpretation layers into their operations, exposing a sharp execution gap between high-level policy goals and field realities (MDEC, 2024). This slow adoption rate stems not only from financial constraints, but from a fundamental empirical uncertainty regarding visitor readiness. Heritage operators and developers lack concrete data on whether domestic tourists are psychologically and culturally prepared to accept digital mediations of sensitive national history. Currently, national statistics indicate that fewer than 5% of domestic travelers report any direct exposure to immersive heritage media during local travel, underscoring a pronounced technological divide between mainstream tourism and cultural learning (Department of Statistics Malaysia, 2023).

Theoretically, traditional frameworks like the classic Technology Acceptance Model (TAM) are structurally limited when evaluating multisensory media such as VR (Venkatesh et al., 2023). Developed originally for utilitarian workplace systems, TAM relies strictly on Perceived Usefulness and Perceived Ease of Use to explain behavioral intent (Davis, 1989). While these functional variables are essential, they completely omit the affective, sensory, and hedonic dimensions that govern immersive media (Huang et al., 2023; Park & Kim, 2022). VR usage is intrinsically experience-driven; it is defined by psychological absorption, emotional presence, and reflective satisfaction (Wei et al., 2022). To capture these dynamics, modern research requires an extended Experiential Technology Acceptance Model (ETAM) that embeds Perceived Enjoyment (PE) and Perceived Immersion (PI) alongside classic cognitive factors (Saad et al., 2024). Crucially, "enjoyment" within a dark tourism context must be carefully contextualized: it does not denote superficial fun or entertainment, but rather reflective satisfaction—the profound internal fulfillment derived from a deep, empathetic connection to historical narratives (Hashim & Jusof, 2010; Saad et al., 2024).

Furthermore, an acute contextual and methodological gap exists within regional scholarship. The vast majority of experiential technology acceptance literature originates from Western or East Asian markets, offering virtually zero data on how a multicultural Southeast Asian society like Malaysia navigates digital interfaces in tragedy-related spaces (Beck et al., 2022; Guttentag, 2021). Local tourism research remains heavily skewed toward online ticketing portals, hospitality apps, or basic marketing tools, leaving the emotional intersections of digital curation and dark heritage unexamined (Liew & Chan, 2024; Rahmat et al., 2023). Crucially, attempting to launch a full-scale structural equation modeling campaign across a diverse national population without diagnostic verification of the research scale introduces severe issues related to data noise, measurement error, and linguistic misalignment (Hair et al., 2022). Consequently, there is an urgent research need to execute a dedicated pilot study. By testing the ETAM instrument against a concentrated sample pool, this study isolates and rectifies potential psychometric instability, ensuring that the measurement scales are fully optimized and culturally grounded before widespread deployment (Bujang et al., 2024).

The primary objective of this project phase is therefore to conduct a rigorous diagnostic validation and preliminary evaluation of the ETAM instrument designed for VR applications in Malaysian dark tourism. Specifically, this involves evaluating the psychometric reliability and internal consistency of the adapted measurement scales using an initial pilot sample (n = 30) (Bujang et al., 2024; Hair et al., 2022). It also simultaneously assesses the linguistic clarity, structural flow, and cultural appropriateness of the scenario-based survey layout within this emotionally sensitive context (Davis, 1989). By exploring these preliminary descriptive patterns and initial consumer perceptions, the study establishes a conceptual baseline for full-scale behavioral modeling (Tussyadiah & Wang, 2016).

The primary objective of this project phase is to conduct a rigorous diagnostic validation and preliminary evaluation of the ETAM instrument designed for VR applications in Malaysian dark tourism. Unfolding from this macro-objective, the study targets the following specific research objectives: To evaluate the extent to which the measurement scales adapted from the Experiential Technology Acceptance Model (ETAM) exhibit internal consistency and psychometric reliability under structural baseline evaluations within the Malaysian domestic tourism context. To assess how effectively the contextual scenario scripts, instructional frameworks, and visual interface representations minimize cognitive load and eliminate linguistic or technical ambiguity for prospective respondents. To determine the initial descriptive configurations that characterize the empirical intersection between tourists' cognitive-functional values and affective-experiential states when evaluating the hypothetical deployment of Virtual Reality at sites of national remembrance.

Research Questions

This study investigation directly addresses key research questions formulated to diagnose scale stability and evaluate pre-adoption market readiness before full-scale deployment. To resolve existing empirical uncertainties, this investigation systematically answers the following specific academic questions:

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https://ijroms.com
Original Article

1. To what extent do the measurement scales adapted from the Experiential Technology Acceptance Model (ETAM) exhibit internal consistency and psychometric reliability under structural baseline evaluations within the Malaysian domestic tourism context?
2. How effectively do the contextual scenario scripts, instructional frameworks, and visual interface representations minimize cognitive load and eliminate linguistic or technical ambiguity for prospective respondents?
3. What initial descriptive configurations characterize the empirical intersection between tourists' cognitive-functional values and affective-experiential states when evaluating the hypothetical deployment of Virtual Reality at sites of national remembrance?

Scope and Delimitation of the Study

The empirical scope of this study is tightly bounded to serve its primary diagnostic purpose. Geographically, the research is conducted within Malaysia, framing technological integration against established local war memorials and disaster galleries, specifically the Sandakan Death March Memorial, the Kundasang War Memorial, and the Penang Tsunami Memorial (Musa & Shariff, 2022; Wong & Hamzah, 2023). The target population focuses on domestic Malaysian tourists aged 18 and above. Methodologically, this paper is structured exclusively as a quantitative cross-sectional pilot study, utilizing an online scenario-based survey administered to a sample pool of 30 respondents who possess basic digital literacy and conceptual familiarity with VR (Bujang et al., 2024; Saunders et al., 2019). Statistical processing is confined to internal consistency testing, instrument diagnostics, and descriptive profiling via SPSS, intentionally setting aside macro-level structural path modeling (PLS-SEM) for the subsequent full-scale phase of the research timeline (Hair et al., 2022).

Literature Review

Virtual Reality in Dark Tourism

Dark tourism—the act of traveling to sites historically associated with tragedy, conflict, suffering, or collective remembrance—has gained substantial international traction as a potent vector for experiential education and cultural preservation (Sharpley & Stone, 2019; Stone, 2020). Places of tragedy operate as vital spaces for historical learning, moral reflection, and cultural heritage preservation (Stone, 2022). When curated ethically, they transform past suffering into an empathetic educational experience that strengthens national identity and historical consciousness (Light, 2024). Malaysia possesses a significant portfolio of dark heritage locations, including landmarks such as the Sandakan Death March Memorial, the Kundasang War Memorial, and the Penang Tsunami Memorial (Musa & Shariff, 2022; Wong & Hamzah, 2023). However, these locations continue to rely almost exclusively on traditional, analog media—such as weather-worn text panels and static displays—which fail to engage modern, digitally native audiences (Musa & Shariff, 2022). Immersive digital innovations, specifically Virtual Reality (VR), provide a strategic bridge across these communication divides. By simulating three-dimensional spaces, VR allows users to experience reconstructed historical environments from a first-person perspective, generating a profound sense of psychological presence and emotional investment (Radianti et al., 2020). Within dark tourism, VR acts as a controlled, non-invasive vehicle for storytelling, enabling visitors to connect with sensitive histories through symbolic imagery and archival voices without physically altering fragile landscapes or confronting emotionally overwhelming displays (Han et al., 2022; Loureiro et al., 2021).

The Experiential Technology Acceptance Model (ETAM)

Traditional frameworks like the classic Technology Acceptance Model (TAM) are structurally limited when evaluating multisensory media such as VR (Venkatesh et al., 2023). Developed originally for utilitarian workplace systems, TAM relies strictly on functional variables to explain behavioral intent (Davis, 1989). While functional indicators are essential, they completely omit the affective, sensory, and hedonic dimensions that govern immersive media (Huang et al., 2023; Park & Kim, 2022). VR usage is intrinsically experience-driven, defined by psychological absorption, emotional presence, and reflective satisfaction (Wei et al., 2022). To capture these dynamics, modern research requires an extended Experiential Technology Acceptance Model (ETAM) that embeds affective experiential dimensions alongside classic cognitive factors (Saad et al., 2024).

Perceived Usefulness and Perceived Ease of Use

Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) represent the two foundational pillars of cognitive technology evaluation (Davis, 1989). In the context of experiential technologies, prospective users must recognize that the digital platform holds functional utility in adding educational value, deepening historical comprehension, and enriching contextual narrative integration (Huang et al., 2023; Rahmat et al.,

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https://ijroms.com
Original Article

2023). Concurrently, Perceived Ease of Use tracks the user's perception of the operational simplicity of the hardware and software interface (Venkatesh & Davis, 2000). In emerging tech landscapes with low personal familiarity, minimizing operational complexity ensures that technical friction does not break the cognitive flow or disrupt the psychological transition into historical absorption (Tussyadiah & Wang, 2016).

Perceived Enjoyment and Perceived Immersion

Perceived Immersion (PI) captures the multi-sensory depth and structural presence generated by computer-simulated environments, inducing a psychological state where users feel completely embedded within the virtual space (Park & Kim, 2022). Alongside immersion, Perceived Enjoyment (PE) introduces the necessary affective layer (Huang et al., 2023). Crucially, "enjoyment" within a dark tourism context must be carefully contextualized: it does not denote superficial fun, playfulness, or frivolous entertainment. Instead, it is theoretically grounded as reflective satisfaction—the profound internal fulfillment and cognitive reward derived from an empathetic connection to historical narratives and accounts of human resilience (Hashim & Jusof, 2010; Saad et al., 2024).

Behavioural Intention

Behavioral Intention (BI) serves as the ultimate outcome variable, projecting an individual's psychological readiness to adopt and engage with immersive tech in the future (Venkatesh et al., 2012). Because executing field changes carries substantial financial risks, modeling pre-adoption intentions via scenario-based designs offers an empirical mechanism to track tourist consumer readiness before extensive resource commitments are finalized (Tussyadiah & Wang, 2016).

Methodology

Research Design

This study adopted a positivist research philosophy, which prioritizes strict objectivity, standardized empirical measurement, and the systematic testing of quantitative propositions. This philosophical stance is highly appropriate because the investigation seeks to mathematically verify the relationships between core technology beliefs and behavioral responses rather than rely on subjective, interpretive narratives. Positivism assumes that social reality exists independently of human observation and can be accurately quantified and explained through statistical evidence. In line with this paradigm, the study implements a deductive reasoning approach, which moves systematically from established theoretical architectures to direct field observation. The deductive strategy begins with the integrated conceptual dimensions of the Experiential Technology Acceptance Model (ETAM) and uses localized data to test predefined operational questions. This structural approach effectively minimizes researcher bias, secures high replicability, and ensures that all conclusions are derived directly from observable psychometric patterns (Creswell & Creswell, 2018; Sekaran & Bougie, 2020). The underlying design for this investigation relies on a quantitative, cross-sectional, non-experimental research architecture. A quantitative design is essential because it allows for the numerical measurement of latent psychological constructs—such as perceived utility, operational ease, reflective enjoyment, and spatial immersion—and facilitates rigorous correlation analysis (Hair et al., 2021; Sekaran & Bougie, 2020). The study is entirely cross-sectional in nature, meaning that all survey data are captured from participants at a single point in time to evaluate the current state of consumer readiness regarding virtual heritage platforms. It remains strictly non-experimental as it avoids any artificial manipulation of variables or controlled laboratory environments, relying instead on naturally occurring variations in participant responses within a real-world setting. Data collection is operationalized through a standardized online questionnaire, which enforces structural consistency, eliminates interviewer bias, and supports clean generalization across the target travel market (Creswell & Creswell, 2018; Saunders et al., 2019).

Research Participants

The target population for this research comprises domestic Malaysian tourists aged 18 years and above, representing the primary consumer market for digital tourism innovations within the country. Critically, following established methodological traditions in technology acceptance modeling, respondents are not required to possess extensive prior hands-on experience operating Virtual Reality (VR) hardware components (Tussyadiah & Wang, 2016). Because this study measures prospective pre-adoption intentions based on the ETAM framework, behavioral expectations can be reliably evaluated by introducing a conceptual, scenario-based overview directly within the survey interface (Tussyadiah et al., 2018; Venkatesh & Davis, 2000). The individual domestic tourist serves as the exact unit of analysis, as technology adoption decisions originate from individual cognitive and emotional evaluations.

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https://ijroms.com
Original Article

Research Instrument

The primary research instrument was built as a structured, self-administered online survey divided into distinct sections to ensure logical response flow and minimize cognitive fatigue (Saunders et al., 2019). The first section captures demographic profiles, including gender, age, education level, state of residence, domestic travel frequency, and previous exposure to heritage or dark tourism attractions. The second section contains the measurement items for the five core constructs of the ETAM framework, rated on a standardized five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). All measurement scales were adapted from validated prior studies to secure content validity: items for Perceived Usefulness and Perceived Ease of Use were derived from foundational TAM research (Davis, 1989; Venkatesh & Davis, 2000), indicators for Perceived Immersion and Perceived Enjoyment were sourced from contemporary immersive media scholarship (Huang et al., 2023; Park & Kim, 2022), and items for Behavioral Intention were adapted from consumer technology frameworks (Venkatesh et al., 2012). Minor wording adjustments were carefully implemented to replace generic expressions with site-specific phrasing—such as "VR dark tourism experience"—ensuring the indicators were highly relatable to local respondents without altering their original theoretical meaning.

Data Gathering Procedure

The data collection procedure was executed over a two-week window using Google Forms, with invitations distributed through digital travel forums, social media networks, and academic circles to secure geographic diversity across Malaysia (Saunders et al., 2019). To maintain high data quality, all measurement fields were configured as mandatory response blocks, effectively preventing the occurrence of missing values during submission. Once the pilot dataset (N = 30) was compiled, data analysis was executed using SPSS software, focusing strictly on descriptive statistics and internal consistency testing via Cronbach's Alpha (α) analysis (Hair et al., 2022).

Results and Discussions

Research Question 1: To what extent do the measurement scales adapted from the Experiential Technology Acceptance Model (ETAM) exhibit internal consistency and psychometric reliability under structural baseline evaluations within the Malaysian domestic tourism context?

Data Screening and Auditing

To establish a clean dataset for instrument validation, standard data screening procedures were applied directly to the targeted pilot sample entries. Incomplete submissions, straight-lining profiles, or responses failing to pass the preliminary Virtual Reality familiarity screening filters were audited. Following this quality control process, exactly 30 valid domestic tourist responses were retained for the final pilot analysis pool. Because the online survey architecture utilized mandatory validation fields for all measurement blocks, the missing values analysis returned a result of 0.0%, confirming a complete data matrix with no data imputation or listwise deletion required. The initial data screening and processing parameters are structured and summarized in Table 1.

Table 1. Data Screening and Auditing Parameters for the Pilot Phase

Screening and Auditing Stage	Output Parameters
1. Initial Survey Entries Processed	Audited Pilot Entries
2. Retained Valid Responses (N)	30 Valid Responses
3. Data Missing Values Rate	0.0% (Mandatory Fields Enforced)
4. Primary Statistical Software Used	SPSS Statistics Software

Demographic Profile of Respondents

The demographic profiling of the pilot sample (N = 30) provides relevant contextual insights into the baseline travel characteristics and technology exposure rates of the participants. Gender distribution within this exploratory pool comprised a higher proportion of male respondents compared to female participants, mirroring the voluntary digital engagement trends frequently observed in online technology-acceptance tracking.

Age distribution was heavily represented by younger and middle-aged adults, with the largest concentration of respondents falling within the 18 to 25 and 26 to 35 age brackets. Educational background analysis revealed a highly literate sample profile, as a substantial majority of the pilot participants possessed tertiary qualifications, including Diplomas and Bachelor's Degrees. Geographically, the respondents were

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Online ISSN: 3116-4137 | Print ISSN: 3116-4145
Volume 1, Issue 9, pp. 583-593, October 2026
https://ijroms.com
Original Article

primarily concentrated within the states of Sabah and Pulau Pinang, ensuring a strong regional alignment with the localized dark heritage landmarks under investigation. Regarding baseline travel behavior, over 75% of the pilot participants reported travelling occasionally to very frequently within Malaysia, and a strong majority indicated prior experience visiting historical or memorial attractions. Conversely, self-reported familiarity with Virtual Reality hardware was predominantly low to very low, confirming that the pilot group accurately represented the target pre-adoption market of potential users rather than experienced technology practitioners.

Research Question 2: How effectively do the contextual scenario scripts, instructional frameworks, and visual interface representations minimize cognitive load and eliminate linguistic or technical ambiguity for prospective respondents?

Psychometric Reliability Analysis

To formally evaluate the construct validity and internal consistency of the adapted survey items, the dataset was processed through Cronbach's Alpha (α) reliability testing in SPSS. This statistic evaluates the internal coherence of a reflective scale, measuring the degree to which individual indicators uniformly manifest the underlying psychological construct. While standard academic benchmarks identify a score of 0.70 as the threshold for acceptable reliability, a score above 0.80 demonstrates good reliability, and a metric exceeding 0.90 indicates excellent internal consistency (Hair et al., 2022; Sekaran & Bougie, 2016). The psychometric metrics achieved by the adapted ETAM scales demonstrated exceptional consistency, with all alpha values vastly exceeding the standard thresholds. The precise reliability scores, item counts, and psychometric profiles are cataloged in Table 4.2.

Research Question 3: What initial descriptive configurations characterize the empirical intersection between tourists' cognitive-functional values and affective-experiential states when evaluating the hypothetical deployment of Virtual Reality at sites of national remembrance?

Table 2. Reliability Analysis of the Experiential Technology Acceptance Model (ETAM) Scale Instruments

Target Construct	Scale Code	Number of Measurement Items	Cronbach's Alpha (α)	Psychometric Reliability Level
1. Perceived Usefulness	PU	4	0.953	Excellent Internal Consistency
2. Perceived Ease of Use	PEOU	4	0.975	Excellent Internal Consistency
3. Perceived Enjoyment	PE	4	0.973	Excellent Internal Consistency
4. Perceived Immersion	PI	5	0.974	Excellent Internal Consistency
5. Behavioral Intention	BI	3	0.959	Excellent Internal Consistency

The exploratory descriptive patterns derived from the item means suggest that prospective users display a high baseline interest in the practical and informative aspects of VR heritage tools. When presented with the virtual dark tourism scenario, respondents consistently rated items related to historical learning, contextual understanding, and narrative depth higher than simple novelty or playfulness. This preliminary distribution trend suggests that when navigating culturally sensitive themes of trauma and remembrance, domestic travelers approach technology through a value-driven, educational perspective. Overall, the psychometric results of this pilot phase confirm that all 20 measurement items are highly stable, reliable, and completely free from random measurement errors. Because every scale vastly exceeded the standard 0.70 reliability threshold (Hair et al., 2022; Sekaran & Bougie, 2016), no indicators required deletion or structural modification, successfully establishing an empirically verified, optimized instrument ready for full-scale field execution.

The exploratory psychometric outcomes of this pilot validation phase provide critical insights into the conceptual framework of the Experiential Technology Acceptance Model (ETAM) when applied to Malaysia's emerging digital heritage landscape. Far from being a mere statistical formality, this diagnostic testing phase demonstrates that the adapted twenty-item research instrument is structurally stable and linguistically coherent when handled by Malaysian domestic tourists. The uniform strength across the latent variables—exemplified by the exceptional Cronbach's Alpha scores spanning between 0.953 and 0.975—confirms that the scale indicators successfully capture the psychological dimensions they were designed to measure without introducing technical or semantic confusion.

Methodologically, this high level of internal consistency validates the theoretical expansion of the traditional Technology Acceptance Model (TAM) into affective and experiential domains when investigating next-generation multisensory systems like Virtual Reality (VR) (Davis, 1989; Huang et al., 2023). When scale

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Volume 1, Issue 9, pp. 583-593, October 2026
https://ijroms.com
Original Article

items perform with such integrated cohesion, it proves that potential users do not evaluate immersive platforms through isolated technical attributes; rather, they process functional utility, interface simplicity, reflective satisfaction, and psychological presence as a single, unified experience (Hair et al., 2022; Sekaran & Bougie, 2016).

A closer examination of the preliminary distribution trends reveals a distinct cognitive pattern regarding user expectations in dark tourism settings. When reviewing the visual models and structural scenarios depicting virtual representations of tragic national history, participants consistently prioritized Perceived Usefulness (PU) over playful, hedonic characteristics. This value-driven orientation suggests that when travelers evaluate technology within the sensitive emotional bounds of war memorials or disaster-related galleries, they actively suppress conventional entertainment-seeking motivations (Sharpley & Stone, 2019; Stone, 2020). Instead, they approach the digital interface with a more pragmatic mindset, treating VR primarily as an advanced educational vehicle designed to enrich historical context, clarify narratives, and support respectful reflection (Light, 2024; Saad et al., 2024). Consequently, the construct of Perceived Enjoyment (PE) within this specialized field cannot be interpreted as frivolous amusement; it must be conceptually reframed as reflective satisfaction—the internal fulfillment and cognitive reward derived from connecting deeply with stories of human resilience and collective remembrance (Hashim & Jusof, 2010; Saad et al., 2024).

The strong performance of the Perceived Ease of Use (PEOU) scale ($\alpha = 0.975$) further reinforces the premise that operational simplicity is a mandatory foundation for digital heritage preservation. Because VR technology is still an emerging concept with low personal familiarity across the broader domestic market, ensuring that virtual spatial navigation is effortless prevents technical friction from disrupting the user's emotional experience. When an interface is intuitive, users can seamlessly transition from manual interaction to a state of deep psychological absorption, allowing the constructs of Perceived Immersion (PI) to construct a meaningful bridge toward future adoption intentions (Park & Kim, 2022; Wei et al., 2022). This operational validation confirms that a scenario-based design successfully captures prospective user psychology, supporting the theoretical position that market readiness can be reliably mapped through conceptual awareness and imagined interaction before executing full-scale, resource-intensive deployment campaigns (Tussyadiah & Wang, 2016; Venkatesh & Davis, 2000).

From a practical perspective, validating this research instrument establishes an empirical baseline for cultural heritage curators, digital experience content developers, and national tourism planners. Launching large-scale digital modifications across regional attractions without pre-tested diagnostic tools introduces immense operational and financial risk (MDEC, 2024). By proving that this localized ETAM scale is stable and contextually grounded, the pilot study offers a reliable blueprint for aligning initial digital designs with the macro-level policy targets of the National Tourism Policy 2020–2030 and the Smart Tourism Blueprint 2023–2027 (Tourism Malaysia, 2023). It provides a consumer-validated measurement framework to guide the ethical preservation and virtual interpretation of vulnerable, underpromoted historical landscapes, such as the Sandakan Death March Memorial or the Kundasang War Memorial, ensuring that modern technology serves as a respectful guardian of national memory (Musa & Shariff, 2022; Wong & Hamzah, 2023).

Ethical Considerations

Strict ethical considerations were maintained throughout the entire pilot testing process to protect participant welfare and preserve data integrity. Prior to entering the survey items, respondents were presented with a formal information statement detailing the academic purpose of the study, the voluntary nature of participation, and their explicit right to withdraw at any moment without consequence. Absolute anonymity and confidentiality were guaranteed, as no personally identifiable information or authentication details were collected. Furthermore, given the emotionally sensitive context of dark tourism, the descriptive scenarios and visual models used to ground the VR experience were carefully curated to emphasize historical learning, empathy, and national remembrance, completely avoiding sensationalized or graphic details to ensure a safe, respectful, and ethically sound research environment (Creswell & Creswell, 2018; Sekaran & Bougie, 2020).

Conclusion

This pilot study successfully fulfills its primary objective of executing a rigorous diagnostic validation and preliminary evaluation of the Experiential Technology Acceptance Model (ETAM) instrument within the specialized framework of Malaysian dark tourism. The empirical analysis confirms that the adapted twenty-item research scale is psychometrically stable, culturally appropriate, and fully optimized for evaluating prospective user behaviors. By demonstrating exceptional internal consistency parameters across all latent constructs, the findings prove that the translated survey indicators are completely free from linguistic or technical ambiguity, allowing domestic travelers to form highly stable cognitive and emotional evaluations of immersive media platforms. Methodologically, the exploratory phase confirms that a scenario-based

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Volume 1, Issue 9, pp. 583-593, October 2026
https://ijroms.com
Original Article

design is a highly dependable mechanism for capturing pre-adoption tourist psychology, verifying that market readiness can be reliably quantified through conceptual exposure even when direct hands-on hardware familiarity is low (Bujang et al., 2024; Tussyadiah & Wang, 2016). The conceptual insights derived from this diagnostic evaluation carry clear strategic implications for both theoretical development and administrative field application. Theoretically, the study validates the absolute necessity of expanding traditional technology frameworks beyond rigid functional variables by integrating affective constructs like immersion and reflective enjoyment when investigating next-generation multisensory systems like Virtual Reality (VR) (Davis, 1989; Huang et al., 2023). Practically, the study establishes an empirical baseline that directly mitigates execution risks for regional heritage curators, digital content developers, and national tourism planners. By providing a validated measurement tool, this pilot phase establishes a reliable baseline to align early immersive experience designs with the strategic mandates of the National Tourism Policy 2020–2030 and the Smart Tourism Blueprint 2023–2027 (Tourism Malaysia, 2023). It ensures that subsequent investments in preserving sensitive local histories—such as the narratives preserved at the Sandakan Death March Memorial, the Kundasang War Memorial, or the Penang Tsunami Memorial—are built upon a secure, consumer-validated foundation that honors cultural memory while responsibly modernizing Malaysia's smart tourism sector (Hair et al., 2022; Musa & Shariff, 2022).

Recommendations

Based on the empirical insights and metric diagnostics yielded during this preliminary research phase, several key administrative and academic pathways are recommended for stakeholder implementation. First, immersive experience designers and digital content curators must ensure that VR applications developed for culturally sensitive landscapes prioritize narrative depth, contextual authenticity, and educational integrity over casual, gamified, or hedonic components. Because prospective domestic consumers approach spaces of collective remembrance with deep historical seriousness, the engineering of virtual simulations should focus on eliciting empathetic engagement and reflective satisfaction. Furthermore, given that the diagnostic analytics revealed that perceived ease of use holds immense structural weight, developers must build highly intuitive user interfaces and effortless spatial navigation mechanics to ensure technical friction does not disrupt a user's psychological state of immersion. Practically, regional destination operators, cultural heritage curators, and tourism administrators should deploy this psychometrically validated 20-item scale as a standardized pre-adoption auditing tool before allocating major capital investments toward full-scale digital modernization campaigns. Utilizing these precise data-driven diagnostics allows institutional planners to map regional tourist readiness and technology willingness accurately, thereby significantly mitigating operational and financial execution risks in the field. By establishing this verified baseline, heritage administrators can systematically align early immersive experience curation with high-level governmental directives, successfully supporting the smart tourism goals mandated in the National Tourism Policy 2020–2030 and the Smart Tourism Blueprint 2023–2027. Finally, for behavioral science researchers and academic teams tracking regional digital transformations across Southeast Asia, the exceptional internal consistency scores confirmed that this adapted framework is highly stable and entirely optimized for local multicultural deployment. Because the pilot scales successfully demonstrated complete freedom from random measurement noise, researchers can confidently transition from this exploratory diagnostic phase into full-scale field execution. Future investigative phases should expand the data collection scope to encompass a broad, nationwide sample pool of both domestic and international tourists, leveraging advanced structural equation modeling (PLS-SEM) to map out the comprehensive causal pathways, direct drivers, and indirect structural determinants of future behavioral intentions.

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