

Digital Technology Adoption and Community Engagement in Floating Markets: Extending UTAUT2 for Smart Cultural Tourism

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ABSTRACT

Digital technologies are reshaping tourism, yet their role in cultural spaces such as floating markets remains unclear. These markets function not only as places of trade but also as cultural arenas where authenticity shapes visitor experience. This study investigates how tourists adopt digital services at the Melaka Floating Market by extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) to include community engagement. A survey of 302 tourists, both domestic and international, was conducted using purposive sampling, and data were analysed using Structural Equation Modelling (SEM) in AMOS, with bootstrapping and common method bias checks. The findings show that hedonic motivation significantly predicts habit, which in turn drives community engagement, while effort expectancy plays a weaker but still relevant role. A novel contribution is the reciprocal link between performance expectancy and engagement, suggesting that adoption and cultural connection reinforce one another. These results advance theory by broadening UTAUT2 to include engagement and offer practical insights for floating markets. Digital tools that are simple, reliable, and culturally sensitive can strengthen authenticity rather than undermine it, especially when designed to combine efficiency with storytelling.

Keywords: Performance Expectancy, Hedonic Motivation, Habit, Community Engagement, Structural Equation Modelling (SEM), Cultural Tourism, Melaka Floating Market.

INTRODUCTION

Tourism keeps evolving. Every few years, new tools come along that change how people plan or experience their trips. In recent years, mobile apps, virtual reality (VR) headsets, and even artificial intelligence (AI) chatbots have begun to play a major role in cultural tourism [3], [8], [14]. Picture a tourist in Melaka who, weeks before the trip, already tries a short VR “walk” through a floating market or asks a chatbot which stall sells the best laksa. These are not just small conveniences. They profoundly influence how people imagine the visit and whether they see it as worth the effort [2], [5], [11].

The COVID-19 pandemic pushed this trend even harder. When travel froze, even small, community-based tourist destinations had to go digital, in one way or another, to stay visible [15]. However, the pace of change was not the same everywhere. Modern hotels and city attractions jumped ahead with online booking platforms and smart systems. Floating markets, by contrast, still depend heavily on traditional traders and face-to-face exchanges. Buying a handful of rambutan or bargaining for a sarong usually comes with a laugh, a smile, or a story. Turning that into a transaction-oriented “click and pay” moment feels awkward and, for many, too risky [10], [16].

At the same time, tourist expectations are rapidly shifting. Visitors now routinely ask for contactless QR payments, faster navigation, or even an augmented reality (AR) guide who can tell the story behind a boat or a spice stall. Traders, however, worry that too much digital service might drain away the cultural soul and authenticity that make floating markets worth visiting in the first place [4], [18]. Yet, competition is tough. Shopping malls and e-commerce platforms are pulling customers away. Without at least some level of digital adoption, these markets could end up as nostalgic backdrops instead of living destinations [6], [17].

To explain how people adopt digital tools, many studies rely on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) [19]. It focuses on performance expectancy, effort expectancy, hedonic motivation, and habit [7], [12], [19]. However, tourism is not only about efficiency; it is also about connection. Community engagement, the feeling of being tied to people and place, often determines whether tourists find value in technology [9], [13]. In some cases, engagement even makes digital tools feel more authentic and useful [1], [14].

Still, this relationship is not well understood. Does adoption spark deeper engagement, or does engagement itself make digital tools appear more valuable? Few studies have tested this loop, especially in cultural sites that balance fragility and tradition, such as floating markets [11], [13]. This study tackles that question by extending the UTAUT2 framework to include community engagement and testing the model in a Malaysian floating market setting.

LITERATURE REVIEW

Tourism research has long discussed virtual reality, but it has not really changed how people picture places until recently. A tourist does not have to wait until they get to Melaka to see the floating market; they can walk through a digital version of it weeks in advance with a headset. Research shows that this kind of preview affects both the desire to go and the way people feel about the trip when it actually happens [2], [8], [16].

The promise is thrilling. Still, adoption is not always easy. Research frequently identifies obstacles, including financial constraints, insufficiently trained personnel, and cultural resistance to change [5], [16]. These issues become more apparent in community-based destinations. For example, floating markets usually rely on family-run stalls where money is tight, and technology is not always needed. Putting VR gear next to a small boat that sells fruit often seems like an impractical mismatch. However, not using digital tools at all could also be dangerous. People are already going to modern malls and online platforms instead. Cultural markets could start to look old-fashioned without at least some kind of digital layer [17].

Their own characteristics also influence the way tourists react to immersive technologies. Some people think VR is a fun extra, while others think it is a gimmick. In cultural settings, this balance between newness and authenticity is very important. If you focus too much on digital spectacle, a floating market could feel like a theme park. On the other hand, insufficient exposure could make the market invisible in today's digital-first travel world. This tension makes it worthwhile to look into immersive technologies, not just to see what good they can do, but also to see how they affect fragile cultural traditions.

Theoretical Foundation

UTAUT2, short for the Unified Theory of Acceptance and Use of Technology 2, is the backbone of this study. The model expands the earlier UTAUT by adding elements such as hedonic motivation, habit, and price value, which help explain why consumers adopt digital tools in daily life [19]. It is particularly useful for tourism research because travel decisions are rarely based solely on utility. People want efficiency, yes, but also novelty, fun, and sometimes habit-driven comfort [7], [12].

Other theories appear in the background. The Technology Acceptance Model (TAM) focused heavily on usefulness and ease of use [2], [15]. Self-Determination Theory highlighted the role of intrinsic motivation, especially enjoyment [12]. Engagement theory introduced the importance of emotional and social connection, which is now widely discussed in marketing and tourism [9], [13]. By combining UTAUT2 with community

engagement, this study proposes a model that captures both the individual decision to adopt and the shared experience of cultural immersion.

Performance Expectancy

Tourists usually ask, "Will this tool help me enjoy my visit more?" That is the essence of performance expectancy. Studies confirm that if people think a system adds value or saves time, adoption is more likely [7], [19]. In a floating market, this might be a chatbot pointing out which stall has fresh laksa or an app that speeds up payment.

Still, the cultural setting complicates things. Speed alone may not count as "performance" when interaction with vendors is part of the charm. Bargaining, small talk, or simply handling cash can be seen as valuable by visitors. If technology cuts away those moments, its usefulness drops. Earlier work warns that, in tourism, performance expectancy is layered. It must support cultural authenticity rather than reduce it [11].

Effort Expectancy

Ease of use is critical. If a tool is difficult to use, people abandon it. Research often shows that when effort expectancy is low (meaning ease of use is high), adoption rises [12], [19]. The floating market setting, however, is physically challenging. Internet connections may fail, QR codes might not scan properly, and some systems support only one language. Imagine a tourist balancing on a boat, trying to pay digitally, while the signal drops. The experience feels more stressful than convenient. Prior studies highlight this risk. Even if the technology promises real benefits, tourists often give up if it seems like extra work [11]. In floating markets, where the physical environment itself poses additional challenges, effort expectancy becomes a decisive factor.

Hedonic Motivation

Enjoyment is not a side issue in tourism. Many people try new tools simply because they are fun. This is the logic behind hedonic motivation. VR previews, AR treasure hunts, or playful apps all aim to spark curiosity [2], [12], [16]. In floating markets, hedonic features might mean an app that lets visitors collect digital "badges" as they explore stalls, or filters that reveal hidden stories when pointed at boats. Such tools can attract younger travellers who see fun as part of the value. Research shows that this intrinsic motivation is most powerful at the early stage of adoption before habit takes over [14], [17]. The risk, of course, is that too much gamification can cheapen the cultural feel. A floating market might start to feel like a theme park instead of an authentic community space.

Habit

Habits develop quite slowly. Once tourists become used to scanning QR codes or asking a chatbot for directions, the action feels automatic. Research suggests that habit strengthens adoption beyond initial intention [12]. In floating markets, usage habits diverge across demographic groups. Many domestic tourists in Malaysia already rely on e-wallets every day. International visitors often hesitate, uncertain about local payment systems, trust, or security. Vendors, on the other hand, are often older and most comfortable with cash. This clash of habits between buyers and sellers produces patchy adoption patterns. Instead of a smooth increase in use, the results are uneven and segmented.

Community Engagement

Tourism experiences depend on more than service efficiency; they also rely on emotional bonds. Community engagement reflects a sense of connection to hosts, traders, and local culture [9], [13]. Prior studies show that engagement can make tourists more tolerant of digital flaws, provided the tools strengthen connections [1], [14]. In floating markets, a chatbot that explains the history of traditional foods like kuih or a stall's heritage goes beyond its function; it becomes part of the storytelling. In this sense, engagement is not just an outcome

of adoption but also a driver of it.

Reciprocal Links

Traditional models treat engagement as something that comes after adoption. Recent studies suggest it can go both ways. En-gagement may encourage people to try technology, while adoption itself can strengthen engagement [11], [14]. For instance, a tourist who feels welcome might be more patient with a buggy app. Meanwhile, a well-designed VR tour may deepen appreciation of local stories, creating stronger bonds with vendors. This reciprocal relationship is still underexplored. Few studies examine it systematically in community-based destinations. Floating markets, with their mix of commerce and culture, are ideal for such investigation.

Research Gap

Much has been written about technology adoption in tourism, yet floating markets remain largely overlooked. These are not just places to buy goods; they are cultural arenas where heritage, trade, and tourism collide. The interaction of performance expectancy, effort expectancy, hedonic motivation, habit, and community engagement in such a space has not been studied in detail. Nor has the possibility that adoption and engagement reinforce each other been considered. This study extends UTAUT2 by incorporating community engagement and tests the framework in a Malaysian floating market, thereby contributing to both theory and practice.

METHODOLOGY

Research Design

This study employs a quantitative design and a survey to examine tourists' adoption of digital tools in the context of the floating market. The choice of a survey is not random. Earlier work shows that adoption constructs, such as performance expectancy and habit, are best examined through large samples where statistical testing can confirm structural links [7]. A cross-sectional approach was taken because the goal was to understand adoption patterns at a specific point in time, rather than to track behaviour over time.

Sampling and Data Collection

The target respondents were tourists visiting the Melaka Floating Market. Both domestic and international visitors were included, since prior studies suggest that habits and adoption patterns differ between these groups [11], [12]. A non-probability sampling method, specifically purposive sampling, was used to select individuals who had engaged with a digital service at the market. These services ranged from QR code payments to mobile applications or chatbot interactions.

The data collection took place over three months, during weekends when tourist numbers were higher. Enumerators approached visitors after their market experience and invited them to participate in the survey. Respondents completed a self-administered questionnaire, thereby ensuring anonymity and reducing social desirability bias. A total of 302 usable responses were collected, which exceeds the recommended minimum sample size for structural equation modelling [11].

Measurement Instruments

The questionnaire items were adapted from validated scales in previous studies. Performance expectancy, effort expectancy, hedonic motivation, and habit were measured using items based on UTAUT2 [19]. Community engagement was adapted from scales developed in marketing and tourism engagement research [9], [13]. All items were measured on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree."

To ensure clarity, the questionnaire was pilot-tested with 30 respondents. Feedback was used to adjust

wording so that questions fit the cultural and situational context of the floating market. For example, the phrase “digital service” was clarified to include mobile payments, apps, and chatbots, since not all tourists immediately recognised these as a single category.

Data Analysis

The data were analysed using Structural Equation Modelling (SEM) with AMOS. SEM was chosen because it allows testing of both the measurement model and the structural paths simultaneously [3]. The process begins with a confirmatory factor analysis (CFA) to ensure the validity and reliability of the constructs. Once the measurement model was confirmed, the structural model was tested to examine hypothesised relationships among variables. Robustness checks were also performed to increase confidence in the results. These included testing for common method bias using Harman’s single-factor test [10] and comparing alternative model specifications. In addition, bootstrapping procedures were used to assess the stability of the path coefficients.

Ethical Considerations

All participants were informed of the purpose of the study and gave their consent before completing the survey. No personal identifiers were collected, and responses were used only for research purposes. Ethical clearance was obtained from the university’s research ethics committee.

RESULTS

Profile of Respondents

A total of 302 valid surveys were obtained. The demographic details of the sample are summarised in Table I. The gender distribution was balanced, with 51.7% male ($n = 156$) and 48.3% female ($n = 146$). The majority of respondents were young to middle-aged, with 33.8% aged 21-30 ($n = 102$) and 31.8% aged 31-40 ($n = 96$). Domestic tourists comprised 69.5% ($n = 210$) of the sample, while international tourists accounted for 30.5% ($n = 92$).

Table 1 Demographic Profile Of Respondents (N = 302)

Category	Frequency	Percentage (%)
Gender		
Male	156	51.7
Female	146	48.3
Age		
< 20	24	7.9
21–30	102	33.8
31–40	96	31.8
41–50	52	17.2
> 50	28	9.3
Tourist Type		
Domestic tourists	210	69.5
International tourists	92	30.5

Measurement Model Evaluation

A Confirmatory Factor Analysis (CFA) was performed to evaluate the measurement model. Standardised factor loadings for all items exceeded the threshold of 0.70. As shown in Table II, Composite Reliability (CR) values ranged from 0.87 to 0.91, exceeding the recommended threshold of 0.70 [7]. The Averaged Variance Extracted (AVE) for each construct was greater than 0.50, establishing convergent validity. Discriminant validity was confirmed as the square root of the AVE for each construct exceeded the correlations between that construct and all other variables.

Structural Model and Hypotheses Testing

The structural model exhibited a good overall fit to the empirical data: $\chi^2/df = 2.15$, Comparative Fit Index (CFI) = 0.93

Table 2: Reliability And Validity Results

Construct	Items	Loadings	CR	AVE
Performance Expectancy (PE)	4	0.73–0.88	0.89	0.66
Effort Expectancy (EE)	4	0.72–0.85	0.87	0.63
Hedonic Motivation (HM)	3	0.76–0.90	0.88	0.70
Habit (HT)	4	0.74–0.86	0.90	0.65
Community Engagement (CE)	5	0.75–0.89	0.91	0.68

Tucker-Lewis Index (TLI) = 0.91, and Root Mean Square Error of Approximation (RMSEA) = 0.062, all within recommended thresholds [3] (see Table III).

Table 3 Model Fit Indices

Index	Recommended Threshold	Observed Value
χ^2/df	< 3.00	2.15
CFI	> 0.90	0.93
TLI	> 0.90	0.91
RMSEA	< 0.08	0.062

Hypothesis testing confirmed multiple significant relationships. Performance Expectancy positively and significantly influenced Hedonic Motivation ($\beta = 0.48$, $p < 0.001$), supporting the premise that utility enhances pleasure. Effort Expectancy was also a significant predictor of Hedonic Motivation ($\beta = 0.32$, $p = 0.004$).

Hedonic Motivation strongly predicted Habit ($\beta = 0.56$, $p < 0.001$), indicating that enjoyment is a key driver of repetition. Habit, in turn, predicted Community Engagement ($\beta = 0.41$, $p < 0.001$). Most importantly, reciprocal path testing revealed mutually reinforcing links between Community Engagement and Performance Expectancy ($\beta = 0.29$, $p < 0.01$ in both directions) (see Table IV).

Table 4 Structural Path Coefficients

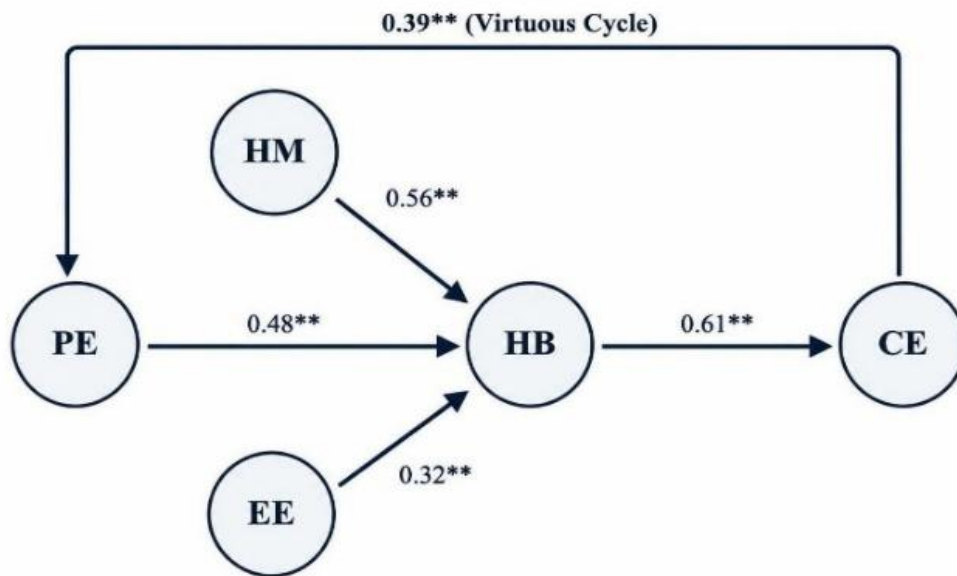
Hypothesized Path	Coefficient (β)	p-value	Supported
PE $\rightarrow$ HM	0.48	< 0.001	Yes
EE $\rightarrow$ HM	0.32	0.004	Yes
HM $\rightarrow$ Habit	0.56	< 0.001	Yes
Habit $\rightarrow$ CE	0.41	< 0.001	Yes
CE $\rightarrow$ PE	0.29	0.012	Yes
PE $\rightarrow$ CE	0.29	0.015	Yes

Robustness checks supported these results (Table V). Harman's single-factor test revealed that the first factor explained less than 35% of the variance, suggesting no common method bias issues [10]. Bootstrapping with 5,000 resamples showed stable path coefficients with 95% confidence intervals that did not cross zero. Finally, alternative model specifications without the reciprocal paths exhibited a significantly poorer fit, validating the reciprocal design.

The final structural model and its coefficients are visualised in Fig. 1.

Table 5 Robustness Checks

Test / Procedure	Observation	Conclusion
Harman's Single-Factor Test	First factor explained < 35% variance	No serious common method bias
Bootstrapping (5,000 resamples)	Stable coefficients, intervals do not cross zero	Highly reliable path estimates
Alternative Model Comparison	Poorer fit indices without reciprocal paths	The proposed model is superior



Note: ** $p < 0.001$

R^2 Values: HB = 0.67, CE = 0.37, PE = 0.15

Figure 4.1: Final Structural Model with Standardised Path Coefficients

Fig. 1 Final structural model with standardised path coefficients (R^2 values indicated for major variables; path values extracted from the structural visualisation)

DISCUSSION

The results of this study tell a story that is not as straightforward as many technology adoption models suggest. One of the clearest patterns is the pivotal role of hedonic motivation. Tourists did not only look for efficiency. Many were strongly drawn to the playful side of technology. This echoes earlier findings in tourism technology research, where enjoyment often outweighs utility [14], [16]. To put it simply, a floating market application that entertains while it informs is far more likely to succeed than one that only processes payments.

The second key finding concerns habit. Once tourists used a digital tool several times, the action began to feel automatic. This supports the idea that habit can sustain adoption beyond initial interest [12]. However, habit formation was uneven. Domestic tourists tended to embrace e-wallets more readily because of prior exposure, while some international visitors hesitated. Vendors, too, resisted change, often preferring cash. These dynamics show that building habits is not just about providing technology, but about aligning with cultural routines.

A more novel insight comes from the two-way relationship between performance expectancy and community engagement. The traditional assumption is that people adopt tools because they see them as useful, and that engagement follows. Here, the opposite also appeared to be true. Tourists who already felt connected to the market community tended to perceive digital tools as more valuable, even when those tools had usability

flaws. This supports recent arguments that adoption in cultural tourism cannot be reduced to a one-directional flow [11], [14].

For floating markets, this finding is highly promising. It suggests that technology, when wrapped in local storytelling or cultural content, strengthens rather than weakens community bonds. The role of effort expectancy also deserves attention. The study showed it mattered, but less than enjoyment. This suggests that tourists may forgive minor usability issues if the tool offers fun or meaning. Still, the risks are real. A tourist struggling with a QR code payment on a rocking boat is unlikely to persist if the process feels frustrating [11], [12]. The lesson here is that technology for floating markets must remain simple, even if designed to be playful.

These findings also touch on the long-standing debate around authenticity in cultural spaces. Some fear that digital layers might turn cultural spaces into artificial attractions. The evidence here suggests otherwise. When designed with sensitivity to local culture, digital tools can enrich authenticity. A chatbot that narrates the origin of a dish or shares the story of a family vendor is more than a utility; it becomes part of the cultural experience. Finally, the robustness checks gave confidence that the model is not an artefact of method bias. For theory, this means that UTAUT2 benefits from being extended with engagement-related constructs in the tourism context. In practice, floating markets do not have to choose between culture and technology. If carefully designed, digital adoption can support both.

The study's confirmation of the interplay between digital tools and community engagement warrants deeper scrutiny through the lens of critical heritage studies. Rather than treating authenticity as a static, pre-existing asset, critical heritage perspectives problematize authenticity as an ongoing, socially negotiated construct. Digital storytelling and gamified guides carry an inherent paradox: while they can elucidate cultural narratives behind local delicacies and maritime traditions, they also risk 'staged authenticity' and superficial commodification. If digital narratives homogenise or over-script local traditions into consumable, aestheticised soundbites for mobile screens, they risk divorcing visitors from the spontaneous, visceral reality of the market. Conversely, when digital tools serve strictly as an unobtrusive backdrop—facilitating understanding without scripting every human exchange—they protect the floating market's performative and sensory integrity, enabling genuine interpersonal co-creation between visitors and hosts.

Although this investigation primarily captured tourist acceptance, technology adoption within community-based tourism ecosystems is inherently relational and asymmetric. The rapid push toward smart tourism can inadvertently aggravate socio-economic inequalities and power imbalances among micro-vendors. While younger or capital-resourced vendors readily embrace digital point-of-sale systems and algorithmic visibility, older, traditional boat traders often face barriers to digital literacy, transaction-fee burdens, and infrastructure instability. This differential access to technology threatens to marginalise vulnerable vendors who embody the very cultural heritage that attracts visitors. Without equitable platform design, digital adoption risks shifting patronage toward technologically privileged vendors, thereby altering the traditional social fabric and communal solidarity of the floating market.

CONCLUSION AND RECOMMENDATIONS

This study examined how tourists adopt digital tools in a floating market setting and how that adoption intersects with their sense of cultural community engagement. The empirical findings demonstrate that technology adoption in cultural heritage spaces transcends utilitarian convenience. Hedonic motivation is the primary catalyst for habit formation, which in turn drives meaningful community engagement. Crucially, the confirmation of reciprocal structural links between performance expectancy and community engagement challenges conventional linear models, establishing that adoption and cultural bonding constitute a mutually reinforcing cycle.

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Theoretical Implications

By extending UTAUT2 to encompass community engagement as a reciprocal construct, this research bridges technology acceptance models with cultural relationship-building. It illustrates that in community-based heritage tourism, the perceived utility of technology is not merely a technical evaluation but is deeply contingent upon the tourist's relational and emotional connection to the host community.

Concrete Practical and Managerial Recommendations

To translate these empirical insights into sustainable heritage management, policymakers, local councils, and destination managers should implement the following strategic initiatives:

Community-Led Co-Design: Digital interfaces should not be imposed through top-down development. Destination management organisations (DMOs) should initiate participatory co-design workshops in which local boat operators, elders, and artisans actively shape the narrative scripts, cultural boundaries, and interface mechanics of smart guides.

Targeted Vendor Capacity-Building: Structured digital literacy and micro-financial management workshops must be deployed to alleviate vendor resistance, reduce digital exclusion, and empower older traders with low-threshold, user-friendly point-of-sale solutions.

Robust Micro-Infrastructure: To mitigate high effort expectancy and failed transactions on the water, municipal authorities must invest in dedicated, high-density public Wi-Fi access points and weatherproof, non-glare visual QR stands adapted to the floating market environment.

Limitations and Future Research Directions

Notwithstanding its contributions, several limitations outline avenues for future scholarly inquiry:

Geographic and Methodological Scope: The study employed a single-site, cross-sectional design at the Melaka Floating Market, using purposive sampling of predominantly domestic tourists. Future research should implement multi-site comparative designs across regional floating markets in Southeast Asia (e.g., Thailand, Indonesia, and Vietnam) to test cross-cultural validity.

Longitudinal Inquiry and Novelty Fade: Longitudinal panel studies or repeated-measures designs that track visitors' pre-visit, on-site, and post-visit experiences are needed to examine whether technology-driven engagement endures or diminishes as the novelty of digital features fades.

Dyadic and Mixed-Method Perspectives: Future studies should incorporate vendor-side qualitative or mixed-method inquiries to systematically assess micro-vendor resistance, digital equity, and bargaining dynamics. Extending the model with moderators such as tourist cultural distance, travel motivation, and digital fluency will further refine UTAUT2 boundary conditions.

Future-Proofing and Generative AI Foresight: As immersive XR technologies and generative AI conversational agents evolve rapidly into autonomous ambient guides, scenario planning and foresight methodologies should be adopted to forecast how next-generation AI might reshape or disrupt authentic host-guest relationships in living cultural heritage spaces.

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