




# Tourist Waste Perceptions, Behavioural Intentions and Technology Receptiveness: Evidence from Kashmir

Tawheed Yousuf\* 

Research Scholar, Department of Economics, University School of Business,  
Chandigarh University, India

**Email:** [dadootawheed@gmail.com](mailto:dadootawheed@gmail.com)

Rupinder Kaur

Associate Professor, Department of Economics, University School of Business,  
Chandigarh University, India

**Email:** [rupinder.e11898@cumail.in](mailto:rupinder.e11898@cumail.in)

**Abstract:** Solid Waste Management (SWM) has become a significant challenge, particularly in fragile environmental zones that depend heavily on tourism, where effective waste management often remains inadequately prioritized. Using the Theory of Planned Behaviour (TPB) as the primary behavioural framework, complemented by insights from the Technology Acceptance Model (TAM) to interpret technology-supportive attitudes, the current study assesses the tourists' perceptions about SWM Practices and the impact it has on tourist behaviour regarding the level of satisfaction about their stay and return intention. Data collected from 763 tourist respondents across Kashmir has been utilised to construct a Waste Perception Index (WPI) with further analysis done using non-parametric tests and ordinal regression to evaluate the behavioural and technological factors. Results indicate that positive perceptions of litter control, bin provision, and public toilet hygiene significantly predict satisfaction and revisit intention. The findings suggest that technology-enabled interventions may offer a viable pathway for the challenges concerning tourism, as the collective feedback suggests that use of informatics can augment tourist attitudes positively.

**Keywords:** Tourism Informatics, Sustainable Waste Management, Theory of Planned Behaviour, Technology Acceptance Model, Tourist Perceptions, Kashmir.

## 1. INTRODUCTION

The tourism industry of Kashmir, famous for its serene landscapes, faces a major challenge of proper Solid Waste Management (SWM), as poor management of Solid Waste alters the composition of environment and ecology of the host areas, thereby challenging the environment sustainability, tourist satisfaction and local

livelihoods dependent on tourism (Jeelani et al., 2023; Kuniyal et al., 2003). The ecological pressure on fragile tourist destinations has increased due to rising global tourism demand; therefore, effective SWM is essential for maintaining destination competitiveness and sustainability (Budeanu et al., 2016). There is therefore a need to understand the factors relating to human behaviour and use of technology in mitigating the challenges posed by the ever-increasing tourism surge pressures. The current study is a step towards arriving at a guiding principle for managing tourist destinations efficiently, by examining the tourist perceptions about SWM practices, particularly about provision of waste collection bins, litter restraint, hygiene in washrooms and how these provisions shape tourist satisfaction and perceptions of the tourism industry in Kashmir, and return intention etc, thereby suggesting use of information technology as a novel way to achieve tourism sustainability. The upswing in tourist volumes has been causing substantial SWM challenges across the Kashmir, particularly the negative impact of inadequate SWM on water quality and region-specific biodiversity (Jeelani et al., 2023). The inadequate waste management infrastructure has emerged as a deterrent for visitor attraction and destination appeal, thus impacting the tourism sector badly. The scenario is no different at global level as well, from Alps to Himalayas, waste management issues arising from tourism footprints have caused immense concern for the stakeholders to take immediate action and arrive at a working solution (Kuniyal et al., 2003). Sustainable tourism and ecotourism practices (Fennell, 2021) should promote a sense of responsibility among tourists toward the environment and ecology which should manifest through waste reduction initiatives. Poor SWM practices not only affects visitors but the livelihood of communities dependent on tourism (Nunkoo et al., 2016), as littered tourist places can lead to less tourist arrival thus less tourist spending impacting the income of locals. Tourism Informatics has the potential to support the tourism

sector in addressing SWM challenges, as technologies like GIS for waste mapping, smart bins and their adequate provisioning, real-time reporting applications will in long way help in managing SWM and visitor management issues efficiently (Boes et al., 2016; Gretzel et al., 2015). Use of such tools can lead to efficiency in waste management and imbibing recycling practices at tourist destinations. (Budeanu et al., 2016). However, use of such tools at tourist locations particularly Kashmir seems hardly thought of, despite their huge potential to mitigate the environmental challenges faced by tourist destinations (Fennell, 2021). The current study aims to address this gap by examining SWM perceptions and discussing how informatics-based approaches may support sustainable improvements. By employing the Theory of Planned Behaviour (TPB) as the primary behavioural framework, and drawing selectively from the Technology Acceptance Model (TAM) to interpret receptiveness toward informatics-based interventions, the current study assesses SWM perceptions and related behavioural intentions (Ajzen, 1991; Davis, 1989). As per TPB, it has been observed that people exhibit behavioural intentions such as revisiting a location or contributing for SWM practices depend upon the perceptions people have about cleanliness, preference for a pristine environment and willingness to pay towards environment conservation (Han et al., 2010). As per Han et al. (2010), a liking for cleaner destinations highlights the explicit impact of solid waste management (SWM) on tourist behaviour. TAM supports the TPB, in elucidating the technology driven behaviour of stakeholders in terms of perceived usefulness and ease of use of the technology linked to SWM at tourist destinations (Davis, 1989; Huh et al., 2009). While integration of TPB and TAM has been applied in predicting smart technology adoption (Bano & Siddiqui, 2024), its application in the context of SWM perceptions remains relatively underexplored (Chen, 2020). Past studies on sustainable tourism have mainly addressed the accommodation or

attractions at tourist destinations, with hardly any attention towards SWM perceptions and tourism informatics at ecologically sensitive areas (Fennell, 2021). Importance of SWM in achieving sustainability has been highlighted by Budeanu et al. (2016), however, tourist perceptions or use of technology for arriving at feasible solutions in fragile environments has not been considered. As SWM plays a crucial role in shaping up of tourist behaviour, limited exploration of integrating behavioural and technological models in the previous studies has created a significant gap (Chen, 2020). Considering this, the current study is an attempt to fill this gap by 1. Analysing perception of Tourists about SWM, 2. Investigating the impact of these perceptions on tourist satisfaction, willingness for revisits and recommendation of tourist destinations to others, and 3. How informatics can provide us solutions for sustainable SWM, with the help of GIS and other related applications.

The current study follows the given structure:

A literature review (Section 2) focusing upon TPB-TAM approaches used in SWM, Section 3, is about Methodology adopted in the current study, Section 4, talks about findings of the research, Section 5, has discussion about the study, Section 6, focusses about Informatics Solutions, Section 7, is about limitations and future scope of work, and, Section 8, is conclusion of the study. Apart from Kashmir, the study can be very helpful at global level as well, as it offers a transferable behavioural framework for similar destinations. The use of WPI alongside a TPB-informed behavioural framework provides a structured approach for researchers and policy makers in arriving at sustainable tourism solutions. Analysing the tourist behaviours by linking destination cleanliness with return intention, monetary contribution for environment conservation etc, the current

study contributes to behavioural insights within sustainable tourism research with focus upon mitigating the environmental challenges linked with global tourism.

## **2 Literature Review**

Sustainable tourism requires adequate SWM measures to maintain the ecological balance of tourist destinations without compromising visitor experience, particularly in locations such as Kashmir. By applying TPB and incorporating insights from TAM, the current study examines tourist perceptions of SWM and discusses potential technology-enabled responses, thereby addressing an identified gap in the literature. Synthesis of the literature on SWM's importance in sustainable tourism, tourist behaviour and integrated theoretical model has been made to make the study reliable and also justify the novelty of the approach used in the study.

### **2.1 Sustainable Tourism and SWM**

Sustainable tourism requires robust SWM measures, as unhygienic washrooms, uncleaned bins, and littered trails reduce destination appeal and contribute to environmental and biodiversity degradation (Budeanu et al., 2016). Owing to the upswing in the tourist arrivals, Kashmir is witnessing a waste management crisis, which leads to ecological and economic loss as of which local livelihood gets impacted (Malik et al., 2015; Jeelani et al., 2023). For example, littering at various serene landscapes or unattended bins does take a toll on destination appeal and also impact local livelihood dependent on tourism (Malik et al., 2015). As per Fenell (2021), ecotourism in addition to environment sustainability should also aim at imbuing environment sensitivity among the visitors, as is the focus of current study on tourist perceptions and pro-sustainability preferences. It has been

observed that SWM issues have a bearing not only on tourists but on the communities dependent on tourism as well, as littered and unmanaged places deter visitor arrival, however, limited efforts have been made to involve locals and other stakeholders to arrive at effective solutions (Nunkoo et al., 2016; Malik et al., 2015). Environmental issues like same are prevalent at global level as well particularly at ecologically sensitive areas which require immediate attention (Kuniyal et al., 2003).

Tourism informatics has emerged as a promising approach for addressing challenges in destination management. Applications such as GIS, smart bins, and mobile applications for waste reporting and recycling can go a long way in making the destinations appealing and sustainable (Boes et al., 2016; Castillo Vizuet et al., 2021; Budeanu et al., 2016). However, the hurdle lies in their non-use at ecologically sensitive areas like Kashmir, despite the fact that many destination management challenges may be mitigated through the strategic use of such technologies (Fennell, 2021; Law et al. 2014). The literature suggests that effective SWM initiatives using tourism informatics could help in maintaining destination competitiveness, but need is to link such a framework with tourist behaviour particularly at ecologically sensitive areas (Fennell, 2021; Jeelani et al., 2023).

## **2.2 Theoretical Frameworks and Research Gaps**

The Theory of Planned Behaviour (TPB) is widely used to understand pro-environmental behaviour among tourists (Ajzen, 1991). It has been also used by Han et al., (2010), in assessing eco-friendly hotel choices, pro-sustainability preferences, understanding and predicting people behaviour under certain conditions. Chiu et al. (2014) elaborated the TPB's usability and aptness in

explaining pro-sustainability attitudes, support for environment sensitivity and conservation, while Waris et al. (2021) effectively used it in South Asia and outlined the norms for clean destinations. Han et al. (2010) sketched out importance of clean destinations, as it imbibes destination loyalty, emphasising SWM measures at a place shape up return intentions among visitors. As Chen (2020) in his study used TPB to assess SWM perceptions, but ignored informatics as a tool to support his analysis, which the current study has taken up to fill the research gap.

The Technology Acceptance Model (TAM) provides additional theoretical insight into factors influencing acceptance of technology-based solution (Davis, 1989). Huh et al. (2009) observed that user friendly information systems are highly effective in day-to-day hotel engagements, a principle of apt for SWM like mobile apps for real time waste reporting, waste collection routes etc. Gretzel et al. (2015), which can make destination management easy, however the same remains underexplored. Past studies have hardly explored integration of TPB-TAM, despite ample evidence linking user friendly technology with effective tourist engagement (Law et al. 2014). TPB-TAM integration has been effectively used by Bano et al., (2024) in forecasting the use of technology in tourism, highlighting relationship between behaviours and technology adoption though the focus was not precisely on SWM.

Synthesis of TPB and TAM is relevant to the current study, allying tourist perceptions, behaviours with technological solutions to solve SWM challenges and issues (Bano et al., 2024). Though the focus of their study was only on predicting use of technology in tourism, ignoring sustainability or behavioural outcomes, the current study extends their model by charting a framework to

SWM, with the help of a feedback mechanism recording perceptions and intentions via Waste Perception Index (WPI).

TPB helps in capturing the perceptions toward litter restraint, norms for managing tourist destinations, volunteering for monetary contributions (Willingness to Pay), and TAM examines the use of technology to arrive at enhanced waste management (Law et al., 2014). Although willingness to pay (WTP) is widely used to assess environmental attitudes, its applicability may vary across contexts, requiring cautious interpretation (Esfandiar et al., 2019). Further, SWM analysis has not been approached multidimensionally such as use of Value-Belief-Norm as an approach of stakeholder dynamics and alternative frameworks (Nunkoo et al., 2016; Batool et al., 2024). The current study employs TPB as the primary behavioural lens, incorporates insights from TAM, and introduces the Waste Perception Index (WPI) to discuss informatics-oriented responses to the identified gaps.

### **3. Research Objectives**

The present study is guided by the following research objectives:

1. To examine tourist perceptions of solid waste management (SWM) practices in Kashmir.
2. To analyse the association between SWM perceptions and tourist satisfaction, recommendation, and revisit intentions.
3. To explore tourists' receptiveness toward structured and potentially technology-enabled waste management interventions.

### **4. Methodology**

The study adopted a quantitative survey approach grounded primarily in the Theory of Planned Behaviour (TPB), while drawing selectively from the Technology Acceptance Model (TAM) to interpret technology-related attitudes

toward SWM in Kashmir (Ajzen, 1991; Davis, 1989). Building upon (Malik et al., 2015) regional tourism research, the current study collected data from 763 tourists (doubled the sample size as calculated from Cochran formula to minimise errors) across multiple tourist destinations of Kashmir, ensuring a robust sample following data screening and cleaning procedures. The respondents were mainly domestic tourists (95.2 %) and around 83.6 % among them were first time visitors. Data was collected following standard research ethics, like seeking consent before data collection, ensuring confidentiality and privacy of the respondents. The questionnaire was carefully designed to align with the TPB-informed framework and to capture the required information relevant to SWM perceptions and behavioural intentions. The questionnaire was divided into three parts. The first part recorded demographic information (gender, nationality etc.). Second part recorded the perceptions about SWM involving questions on litter control, bin provision and maintenance, dumping practices, status of public washrooms etc., all measured on 1-5 Likert Scale (1= strongly disagree and 5= strongly agree). For index construction, five core indicators—bin availability, bin maintenance, litter control, public washroom hygiene, and waste segregation—were aggregated to compute the Waste Perception Index (WPI) as their arithmetic mean. The index ranged from 1 to 5, with higher scores indicating more favourable waste management perceptions. WPI demonstrated acceptable internal consistency with a Cronbach's alpha of 0.704, consistent with similar behavioural studies (Chiu et al., 2014). The third part evaluated the influence of SWM perceptions on tourist enjoyment, recommendation likelihood, return intentions, willingness to pay, consciousness about negative SWM impacts, using 1-5 scales and Yes/No/Maybe options, as standard techniques in sustainable tourism research (Wang et al., 2021).

Analysis was conducted using descriptive statistics to outline perceptions and experiences. Group comparisons of satisfaction levels based on awareness and return intention were conducted using Mann–Whitney U and Kruskal–Wallis tests, as standard tests used in tourism research (Puhakka, 2011). Chi-square tests examined associations between variables such as awareness and return intention. Ordinal logistic regression was employed to model outcomes such as satisfaction and return intention, with multicollinearity assessed using variance inflation factors ( $VIF < 5$ ), aligning with TPB applications. (Han et al., 2010).

The comprehensive approach aimed at examining behavioural relationships within a TPB-informed framework while incorporating technology-oriented considerations (Castillo Vizuite et al., 2021), thereby laying a solid foundation for understanding tourist perceptions and behavioural implications. While TAM informed interpretation of technology-supportive attitudes, the study did not directly operationalize the full constructs of perceived usefulness and perceived ease of use, and therefore does not constitute a full structural validation of the TAM model.

## **5. Findings**

Based on 763 responses, this section outlines the key findings regarding SWM practices in Kashmir. As outlined earlier, the study applied a TPB-informed framework while incorporating technology-related considerations to explore tourist perceptions about SWM practices at tourist destinations and how these perceptions impact their behaviour of return intention, recommendations, willingness to pay etc. (Ajzen, 1991; Davis, 1989). The findings are detailed in three parts- tourist perceptions about SWM practices, how they influence their behaviour and the empirical analysis supporting these associations, which may be useful for stakeholders.

### **5.1 Tourist Perceptions of SWM Practices**

Tourists responded to the queries regarding SWM elements, like bin availability, their maintenance, litter control, public washroom/toilet hygiene and waste segregation. Approximately 69% of respondents rated bin availability positively, more than 50% recorded positive response regarding their maintenance, which exhibits sound infrastructure consistent with sustainable destination studies (Dolnicar et al., 2008). Regarding litter control, responses were mixed, some seeing it as a concern (around 25%), suggesting variability in cleanliness levels, possibly influenced by contextual geographic challenges (Kuniyal et al., 2003). Public washroom/toilet cleanliness and waste segregation turned out to be weakest points as they performed poorly, over 50% suggesting requirement of significant improvement in the said parameters, which can be seen as a challenge in tourism boom areas (Pham Phu et al., 2019).

These observations have been converted into a single measure, Waste Perception Index, a credible tool that amalgamates these ratings, which is consistent with prior TPB research (Han et al., 2010). In many studies Zero Waste Index (ZWI) as an institutional metric, has been used to assess performance of urban or national waste mechanisms (Zaman et al., 2013), however, ZWI doesn't talk about end user's real-world experience. WPI complements institutional measures such as ZWI by assessing the ground level experiences of tourist about cleanliness, infrastructure availability, waste segregation at tourist destinations. WPI complements institutional measures by incorporating end-user perceptions by integrating real world experiences with structural performance indicators in order to have sustainable waste management assessment.

Tourists who rated waste management more positively were also more likely to express return intentions, indicating a significant association between good SWM

practices and visitor loyalty. At the same time, many raised concerns about toilet cleanliness and the lack of proper waste segregation—areas that clearly need more attention. Importantly, a majority (69%) were satisfied with the availability of bins, which suggests there's real potential to build on this with smart solutions like sensor-based bins. The dissatisfaction with hygiene and segregation also points to where technology could help, through tools like mobile apps for real-time complaints or GIS systems to monitor problem areas (Huh et al., 2009).

## **5.2 Impact on Tourist Experience and Intentions**

The study also captured how SWM impacts tourist behaviour regarding tourist satisfaction, enjoyment, and future plans. A large proportion of respondents (86%) indicated that proper waste management was important to their enjoyment, showing how important proper waste management is for tourists, consistent with earlier tourism studies. (Puhakka, 2011). On satisfaction front, responses were moderate, as around 64% respondents were satisfied with the existing measures, however nearly 50% didn't approve of recommending Kashmir to others due to destination image consistent with stakeholder studies on tourism.

(Nunkoo et al., 2016). About intentions of return visits, the responses were divided, with only 29% willing to return, but importantly around 98% people responded that they'll return if SWM improves, highlighting how destination loyalty is linked with SWM at tourist destinations (Ramkissoon et al., 2011). Almost all the respondents were willing to pay for better services aimed at sustainability, reflecting importance of destination management as outlined in pro-environment behaviour studies (Esfandiar et al., 2019). Surprisingly, only 24% respondents showed negative SWM impacts, with first time visitors showing more SWM impact in comparison to repeat visitors, maybe the repeat visitors become habitual of existing SWM practices. The results suggest that improved SWM

could help destination loyalty positively and can also fund innovation informatics driven solutions. The high willingness to pay indicates strong support for improved waste management initiatives indicating openness toward structured interventions, including technology-enabled solutions like GIS enabled routes, smart bins, designed to improve SWM will help in maintaining destinations clean and appealing. The observations regarding moderate tourist satisfaction (64%) and possibility of return intentions (97.8%), if SWM is improved, points towards informatics driven solutions which can play a crucial role in turning these opportunities and weaknesses into strengths (Gretzel et al., 2015).

### **5.3 Statistical Evidence Linking Perceptions to Behaviours**

To understand impact of perceptions on tourist behaviour, data was analysed using Mann-Whitney U, Kruskal-Wallis, Chi-square, and ordinal logistic regression. WPI, with conformity from Cronbach's alpha of 0.704, played instrumental role, in data analysis and data interpretation, with higher scores indicating likelihood for return, as shown in the Table 1, in conformity with TPB applications (Han et al., 2010). Tourist satisfaction also played a vital role, with those willing to return are more satisfied, though repeat visitors showed lower satisfaction, possibly due to change in expectations or diminishing returns from a destination, which should be a point of concern in maintaining sustainability and destination appeal (Ramkissoon et al., 2011). Respondents' conscious about poor SWM conditions showed reduced satisfaction and return plans, signifying the importance of improvements required for sustainable tourism practices (Puhakka, 2011). Detailed analysis based on additional tests showed that effective litter control and bin maintenance are main factors impacting tourist satisfaction, however, concerns about toilet and waste segregation, though significant showed lesser direct effect (Esfandiar et al., 2019).

Specifically:

- Tourists observing inadequate SWM at tourist destinations showed less satisfaction, a difference confirmed by Mann-Whitney U, complementing the link between perceptions and outcomes (Han et al., 2018).
- Varied Return intention associated with satisfaction, with those planning to return feeling more satisfied, a trend identified by Kruskal-Wallis, consistent with loyalty studies (Ramkissoon & Uysal, 2011).
- Awareness of problems associated with SWM reduced return likelihood among tourists, and willingness to pay was tied to higher return intentions, both supported by Chi-square tests reflecting TPB's normative drivers (Chiu et al., 2014; Waris et al., 2021).
- The predictive power of WPI and satisfaction on return intent was confirmed by ordinal logistic regression, opening possibilities for adoption of technology as per smart tourism research (Gretzel et al., 2015).

To interpret technology receptiveness, willingness to pay (99%) was considered as an indicative measure of support for enhanced waste management systems. Enhancing behaviours like destination loyalty, return likelihood etc can be seen as an outcome of initiatives such as litter control, bin maintenance complemented with user friendly technological solutions e.g, mobile applications for smart waste collection complementing TPB findings with TAM insights (Huh et al., 2009). The outlined patterns align with the TPB-TAM framework, wherein WPI as an attitude and willingness to pay as perceived control determine intentions and adoption of technology could help in overcoming the identified weaknesses.

Table 1.

Summary of key statistical results testing relationships between tourist perceptions, satisfaction, and behavioural intentions regarding waste management in Kashmir.

Test Model	Variables	Statistic / OR	p-value	Effect Size / DF	Interpretation
<b>Mann–Whitney U</b>	Satisfaction × Visited Before	U = 33,267	0.002	r = – 0.166	Repeat visitors reported lower satisfaction with current SWM services—a likely effect of expectation decline or accumulated negative experiences.
<b>Kruskal–Wallis H</b>	Importance of SWM × Return Intention	$\chi^2 = 6.90$	0.032	$\epsilon^2 = 0.00906$	Importance of SWM differed across return intentions, though with a small effect; those who intended to return rated SWM as more important to enjoyment.
<b>Chi-square</b>	Return Intention × Noticed Negative SWM	$\chi^2 = 120$	< 0.001	df = 2	Awareness of SWM issues reduces likelihood to return
<b>Fisher’s Exact Test</b>	Return Intention × Return if SWM Improved	–	< 0.001	–	Many reluctant tourists say they’d return if SWM improved
<b>Chi-square</b>	Visited Before × Noticed Negative SWM	$\chi^2 = 15.4$	< 0.001	df = 2	First-time visitors more likely to notice SWM issues

<b>Ordinal Logistic Regression</b>	Satisfaction ~ Litter, Bins, Maint., Tourist Type, Visited	OR: Litter = 2.80**, Bins = 1.22*, Maint. = 1.38**, Repeat Visit = 0.49**	.000 / .033 / .000 / .000	-	Cleanliness variables (especially litter and bin maintenance) significantly enhanced satisfaction, while repeat visitation had a negative effect.
	Return Intention ~ WPI, Satisfaction, Awareness, Type, Repeat	OR: WPI = 5.67**, Satisfaction = 1.52**, Awareness = 0.376**, Repeat Visit = 0.354**	< .001 / .001 / < / < .001	-	Waste perception and satisfaction were positively associated with higher return likelihood, while awareness of poor conditions and prior visits reduced it.

Note: Non-parametric tests were used for ordinal data. Fisher’s exact test was applied for low-frequency cells. All regressions were tested for multicollinearity.

These consolidated findings provide a robust empirical foundation for interpreting how tourist perceptions of waste management influence satisfaction and behavioural outcomes, as explored in the following discussion section.

### 6. Discussion

The following proposals are conceptual implications derived from the empirical findings rather than directly tested interventions. The findings demonstrate that tourist perceptions of solid waste management (SWM) in Kashmir are significantly associated with their experiences and behavioural intentions, interpreted primarily through a TPB-informed framework with technology-related considerations (Ajzen, 1991; Davis, 1989). The Waste Perception Index (WPI) was positively associated with return intention, indicating that more favourable waste perceptions

corresponded with higher revisit likelihood; thus, tourists with high positive perceptions of SWM are much more likely to revisit the place (Han et al., 2010). This is again related to environmental psychology in that a clean environment stands for trust and care, and this increases the prospects of visitor loyalty (Ramkissoon & Uysal, 2011). Well-maintained bins and effective litter control appear to function as visible quality cues shaping tourists' evaluation of the destination environment, especially in fragile environments such as Kashmir (Kuniyal et al., 2003). The positive evaluation of bin-related infrastructure suggests that visitors may be receptive to further improvements, including technology-enhanced waste management systems, such as, smart bins with sensors as being potentially useful to maintain these quality cues, which is in line with the model emphasis on perceived usefulness (Huh et al., 2009). On the other hand, Concerns regarding public toilet cleanliness and waste segregation were frequently reported, showing that the social norms have remained unmet, thus, pointing to a gap in destination commitment toward sustainability (Waris et al., 2021). Thus, these weaknesses in Kashmir stand as a barrier to satisfaction, which is moderate at 64%, and almost half the population would not consider recommending Kashmir, thereby having serious reputational implications (Nunkoo & Ramkissoon, 2016). The near-universal willingness to pay (99.9%) reflects strong stated support for improved waste management initiatives, although this may also be influenced by social desirability or hypothetical bias (Esfandiar et al., 2019; Chiu et al., 2014). Almost unanimous dominance in WTP leaves conceptual tension: while it indicates strong pro-environmental intent, it might mask social desirability or hypothetical biases in that tourists lay down their ideal preferences in surveys but may not be willing to bear the expense on a real basis (Kahneman, 2011). Further inquiry into payment thresholds, experimental pricing, or simulation of transaction settings to validate the salience of stated support is therefore needed. Intriguingly, only 24% had

registered any negative SWM impact, with first-time visitors more perceptive than repeat visitors, maybe due to their ability to view things from a fresh perspective, whereas the lower satisfaction and return intent form of repeat visitors indicates the decline in the perceived quality as time passes (Puhakka, 2011). These interpretations remain speculative and would require longitudinal investigation for confirmation. Alternatively, the newbie visitors may suffer from a novelty effect as they miss out on flaws that returnees easily spot. Such divergences stress the need for diversified approaches to retain satisfaction amongst the loyal market segment, instead of simply attracting the newcomers, hence sustaining the importance of consistent quality provision in SWM for the long term.

From a technology receptiveness perspective, high willingness to pay may indicate openness toward structured and potentially technology-enabled waste management systems, such as GIS-mapped waste routes or mobile applications. Such tools may enhance operational efficiency and encourage public participation. If designed for user-friendliness, they could help reduce perceptual gaps and improve visitor experience, consistent with the principles of smart tourism (Gretzel et al., 2015). From a theoretical standpoint, the study extends TPB-based behavioural analysis by incorporating technology-related considerations inspired by TAM and depicting the interplay of attitudes (WPI), norms (cleanliness expectations), and control (willingness to pay) that lead to behaviour (Chen, 2020). Consequently, the study provides a behavioural interpretation informed by TAM-related concepts, advancing the idea of informatics as a solution to perception gaps, with a consequent effect on engagement (Huh et al., 2009). The approval for bin-related infrastructure is high (69%), along with willingness to pay (99.9%), showing tourists consider technology-driven solutions useful. In contrast, toilet cleanliness needs improvement, and segregation could highlight the importance of easy tools; this strengthens the two TAM constructs in tandem with the TPB drivers. Beyond

Kashmir, the WPI and TPB-informed behavioural approach may be adapted for other ecologically fragile regions, thereby making a contribution to global sustainable tourism research (Bano and Siddiqui 2024). Considering stakeholders, perceptions of SWM have an impact on the local community, which depends on tourism for sustainability. Looking from a behavioral economics viewpoint, leverage stated willingness to pay to support sustainable financing mechanisms for eco-conscious products, thus possibly changing how destination management plots out (Kahneman 2011). Such considerations further improve our understanding of the tourism side of SWM and thereby provide an all-encompassing global model for balancing ecological with economic goals.

The framework based on the WPI developed in this study probably can be applied to other fragile eco-domains. Similar problems confront alpine national parks, coastal tourism centers, and island communities. Such destinations typically experience high tourist pressure combined with relatively weak waste infrastructure. In such situations, perceptual instruments such as the WPI serve to evaluate not only waste performance but also tourist satisfaction and sustainability alignment. Although the basic behavioral drivers proposed in the TPB-TAM model would be relevant, it would be interesting to see how cultural values, technological penetration, and the type of destination call for adaptive calibration. Of course, the model poses interesting questions which need to be put to test in tourism landscapes that are different from ones that are geographically and culturally.

## **7. Policy Implications**

The following policy implications are derived from the empirical findings and represent conceptual recommendations rather than directly tested interventions. To address the identified SWM challenges, particularly toilet/washroom cleanliness

and waste segregation, this section outlines potential informatics-based interventions informed by behavioural findings and technology receptiveness considerations (Davis, 1989; Huh et al., 2009). The use of sensor-enabled smart bins may reduce overflow incidents, potentially supporting litter control and improving maintenance perceptions (Boes et al., 2016). Mobile applications enabling real-time cleanliness reporting and recycling guidance could enhance segregation awareness and encourage greater participation such as guiding people to nearest bins (Castillo Vizquete et al., 2021). Besides, GIS-mapped routes designed for waste identification can help in optimisation of waste collection, reduction of visible litter, while AI-assisted scheduling systems could be explored to optimise waste collection timing and service delivery patterns (Gretzel et al., 2015). The high stated willingness to pay suggests potential financial support for structured waste management improvements, subject to feasibility assessment and policy design, thereby contributing to a sustainable model and other similar destinations (Zaman & Lehmann, 2013). Such interventions could contribute to strengthening sustainable destination management and enhancing visitor experience.

## **8. Limitations and Future Directions**

Although the current study provides useful insights, it is not free from limitations that shape its scope and suggest future course of research. The sample, consisting of 95.2% domestic tourists, may not fully reflect the behaviour or perceptions of international visitors, which could differ due to cultural and experiential factors (Puhakka, 2011). As the study relies on self-reported survey data, responses may be subject to social desirability bias and perception-based distortions, particularly regarding willingness to pay for environmental improvements. The cross-sectional

design captures perceptions at a single point in time and does not allow assessment of how attitudes and behavioural intentions evolve over time; longitudinal research could address this limitation (Budeanu et al., 2016). Besides, the reliability of proposed tools will come to fore only when they're tested in real world settings validating their actual impact. These directions enhance the study's contributions and guide sustainable tourism research.

Additionally, while the study draws on TPB and incorporates insights from TAM, it does not employ structural equation modelling to test full latent construct relationships, nor does it operationalize all core TAM variables. Future research may adopt SEM-based approaches to validate comprehensive behavioural and technology acceptance pathways. Moreover, the informatics-based interventions discussed are conceptual implications derived from behavioural findings and were not empirically tested within this study.

## **9. Conclusion**

The study focusses upon the importance of SWM in shaping up the tourist behaviours at tourist destinations with Kashmir as no exception, highlighting how positive perceptions, recorded through WPI, impact tourist satisfaction and destination loyalty (Bano & Siddiqui, 2024). By applying TPB and incorporating insights from TAM, the study assesses how preferences, attitudes, norms and adoption of technology are highly associated with sustainable tourism (Ajzen, 1991; Davis, 1989). The outlined informatics-based solutions, like smart bins, mobile applications, GIS mapped routes and now AI- provide actionable initiatives for stakeholders and policymakers to overcome the identified challenges and weaknesses, thereby positioning Kashmir as a sustainable and appealing destination. (Hoornweg et al., 2012). Despite the identified limitations, the

outcomes and findings coupled with WPI metric can be applied to other locations facing similar concerns, thus contributing to ecotourism efforts and smart destination management. Future research can add upon these insights to foster cleaner, more resilient tourism ecosystems worldwide

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