

# Perceived Green Value in Digital Wallet Use: Consumer Environmental Concern and Online Transaction Behaviour

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**Abstract:** This study investigates how consumers connect everyday digital wallet use with perceived environmental value and online transaction behaviour in an emerging Indian city. The work responds to a gap in digital payment research, where e-wallet adoption is commonly examined through convenience, security and usefulness, but less often through the consumer's sustainability lens. Data were collected from 458 digital-wallet users in Tiruchirappalli District, Tamil Nadu, India, through a structured questionnaire. The analysis combines percentage analysis, univariate testing, cross-tabulation, correspondence analysis, correlation and multiple regression. Additional effect-size, confidence-interval and aggregate-path diagnostics are reported to interpret the practical strength of the relationships rather than relying only on p-values. Environmental concern was meaningfully above the neutral point, with 57.9 per cent of respondents reporting very or extremely high concern. Occupation and income significantly influenced environmental concern, whereas age was not significant in the univariate model. Consumer perspectives on digital wallets were positively associated with perceived environmental impact and online transaction behaviour. Perceived environmental impact also positively predicted online transaction behaviour and showed a stronger standardized effect than consumer perspective in the regression model. An exploratory aggregate-path assessment further indicated a partial indirect link from consumer perspective to online transaction behaviour through perceived environmental impact. The study extends green digital finance research by treating perceived environmental value as part of consumer-level digital wallet evaluation. It offers evidence from a non-metropolitan Indian context, where digital payments are expanding rapidly but sustainability-oriented fintech research remains comparatively limited.

**Keywords**— digital wallets; green digital finance; sustainable fintech; environmental concern; online transaction behaviour; technology acceptance; consumer behaviour.

## INTRODUCTION

Digital wallets have become a central component of contemporary financial technology. By enabling consumers to store payment credentials, complete online purchases and transfer funds through mobile devices, digital wallets have altered the way individuals participate in retail, banking and service transactions. In India, the growth of mobile internet, unified digital payment infrastructure and platform-based commerce has accelerated the diffusion of digital payment practices across urban and semi-urban consumer groups. This transformation is typically examined through the lens of convenience, speed, security, financial inclusion and transaction efficiency. However, the sustainability implications of digital wallet adoption have received comparatively limited empirical attention in consumer research.

The environmental debate surrounding digital wallets is not one-dimensional. On the positive side, digital wallets may reduce the use of paper bills, printed receipts, plastic cards and physical travel associated with conventional payment and shopping practices. In this sense, they can support dematerialisation and facilitate a more traceable, less

paper-intensive payment ecosystem. On the negative side, digital wallets depend on smartphones, network infrastructure, cloud platforms, data centres and repeated device upgrades. These elements are associated with energy consumption, carbon emissions, resource extraction and electronic waste. Consequently, digital wallet usage cannot be assumed to be automatically sustainable; its environmental value depends on how consumers, providers and regulators understand and manage the broader digital payment ecosystem.

Consumer perception is important because sustainability-oriented financial technology will not gain meaningful traction unless users recognise and value its environmental dimensions. When consumers view digital wallets as convenient and trustworthy, adoption is likely to increase. When they also perceive the payment system as environmentally responsible, digital wallets may become part of a broader pattern of green consumption and responsible digital behaviour. Yet the extent to which consumers consider environmental impact while choosing a digital wallet remains underexplored, particularly in Indian regional markets where digital adoption is rising beyond metropolitan centres.

This study addresses that gap by investigating consumer perspectives on the environmental impact of digital wallets in online transactions in Tiruchirappalli District, Tamil Nadu. The study focuses on consumer environmental concern, demographic influences, environmental factor preferences, and the relationship among consumer perspectives, perceived environmental impact and online transaction behaviour. By examining these issues, the paper extends the discussion on digital wallets from a purely adoption-oriented view to a sustainability-sensitive consumer behaviour perspective.

The paper makes three contributions. First, it positions digital wallet usage within the emerging domain of green digital finance by examining environmental concern and perceived sustainability benefits at the consumer level. Second, it contributes empirical evidence from a tier-II Indian district, thereby moving beyond the metropolitan focus common in fintech adoption studies. Third, it provides practical implications for digital wallet providers and policymakers by identifying the environmental messages and consumer segments that may support more responsible digital payment practices.

Beyond these contributions, the study treats perceived environmental value as a consumer-level cognitive mechanism rather than as a purely objective environmental-footprint measure. This distinction is important for high-quality digital-finance research because consumers usually respond to the environmental meanings that they perceive in a payment technology before verified lifecycle evidence becomes available. The study therefore clarifies the behavioural relevance of perceived green value while openly acknowledging that perception-based sustainability findings should not be interpreted as technical lifecycle assessment results.

### **Statement of the Problem**

Digital wallet adoption is widely discussed in terms of convenience, speed, security, usefulness and transaction efficiency. However, limited attention has been given to how consumers understand the environmental value of digital wallets in online transactions. Although digital wallets may reduce paper receipts, cash handling, plastic card use and physical transaction-related travel, they also depend on smartphones, internet connectivity, data centres and digital infrastructure that may contribute to energy consumption and electronic waste. Therefore, digital wallets cannot be treated as automatically sustainable without examining how consumers perceive their environmental implications.

The problem addressed in this study is the limited empirical understanding of consumer environmental concern and perceived green value in digital wallet usage. Existing digital payment studies generally emphasise adoption intention and usage behaviour, while consumer-level sustainability perceptions remain underexplored, especially in non-metropolitan Indian contexts. This study therefore examines whether consumers in Tiruchirappalli District recognise the environmental implications of digital wallets

and whether such perceptions are associated with their online transaction behaviour.

### **Research Questions**

- RQ1. What is the level of consumer environmental concern regarding digital wallet usage?
- RQ2. Do demographic factors such as age, occupation and income influence environmental concern toward digital wallets?
- RQ3. What environmental factors influence consumers while choosing digital wallets for online transactions?
- RQ4. Are consumer perspectives on digital wallets and perceived environmental impact associated with online transaction behaviour?
- RQ5. Does perceived environmental impact partially explain the relationship between consumer perspectives on digital wallets and online transaction behaviour?

### **Objectives of the Study**

#### **General objective**

To examine consumer perspectives on the perceived environmental value of digital wallet usage and its relationship with online transaction behaviour among digital-wallet users in Tiruchirappalli District.

#### **Specific objectives**

1. To assess consumer concern regarding the environmental impact of digital wallet usage.
2. To examine the influence of age, occupation and income on consumer environmental concern toward digital wallets.
3. To identify the major environmental factors that influence consumers while choosing digital wallets for online transactions.
4. To analyse the relationship among consumer perspectives, perceived environmental impact and online transaction behaviour.
5. To examine the predictive effect of consumer perspectives and perceived environmental impact on online transaction behaviour.
6. To explore whether perceived environmental impact partially mediates the relationship between consumer perspectives on digital wallets and online transaction behaviour.

### **Hypotheses of the Study**

**H1:** Consumer perspectives on digital wallets are positively associated with perceived environmental impact.

**H2:** Consumer perspectives on digital wallets are positively associated with online transaction behaviour.

**H3:** Perceived environmental impact is positively associated with online transaction behaviour.

**H4:** Consumer perspectives on digital wallets and perceived environmental impact significantly predict online transaction behaviour.

**H5:** Consumer environmental concern regarding

digital wallet usage differs significantly across demographic groups.

**H6:** Environmental factors influencing digital wallet usage vary across age groups.

**H7:** Perceived environmental impact partially mediates the association between consumer perspectives on digital wallets and online transaction behaviour.

## LITERATURE REVIEW

Recent digital-wallet research increasingly moves beyond simple adoption intention and examines continuance, trust, network externalities, merchant adoption, and sustainability-oriented knowledge. Studies using UTAUT, expectation-confirmation and PLS-SEM approaches show that continued e-wallet use is shaped by performance expectations, effort expectations, satisfaction, service experience, trust and network effects (Reza et al., 2024; Shetu et al., 2022; Tan et al., 2024).

A newer stream connects digital wallets with environmental sustainability. Katini et al. (2025) empirically linked mobile-wallet use with environmental sustainability through a moderated-mediation design, while Zaidan et al. (2025) demonstrated that environmental knowledge can condition continuous intention to use e-wallets. Aliakhbar et al. (2026) further frame digital wallets as enablers of sustainable digital finance and ESG

integration. These studies justify the present article’s focus on whether perceived environmental value is behaviourally meaningful among Indian consumers.

The present study differs from most adoption papers by examining a secondary-city Indian market rather than only metropolitan or national samples. This contextualisation is important because digital-finance inclusion in India increasingly extends beyond large urban centres, but consumer awareness of the environmental implications of fintech may not diffuse uniformly across regions, income groups and occupational categories.

## Research gap

Despite growing research on e-wallet adoption, three gaps remain. First, many studies examine digital wallets through convenience, security and adoption-intention variables, while fewer studies empirically examine consumers’ sustainability perceptions of digital wallets. Second, the environmental discussion often appears at the conceptual level and lacks consumer-level evidence from emerging markets. Third, existing Indian studies on digital payments frequently focus on metropolitan or general cashless-payment adoption and provide limited insight into tier-II urban districts. The present study addresses these gaps by empirically examining digital-wallet-related environmental concern and online transaction behaviour among consumers in Tiruchirappalli District.

## Theoretical Framework

This study draws on an integrated technology adoption and green consumer behaviour perspective. From the technology adoption side, favourable consumer perspectives on digital wallets are expected to support online transaction behaviour because consumers who perceive digital wallets as useful, convenient and reliable are more likely to use them. From the green consumer behaviour side, perceived environmental impact can strengthen the attractiveness of digital wallets when consumers associate them with reduced paper use, lower physical transaction costs or sustainability-oriented provider practices.

The conceptual framework therefore links consumer perspectives on digital wallets and perceived environmental impact with online transaction behaviour. Demographic characteristics are treated as grouping variables because environmental concern and digital finance usage may vary by age, occupation and income. Figure 1 presents the proposed model.

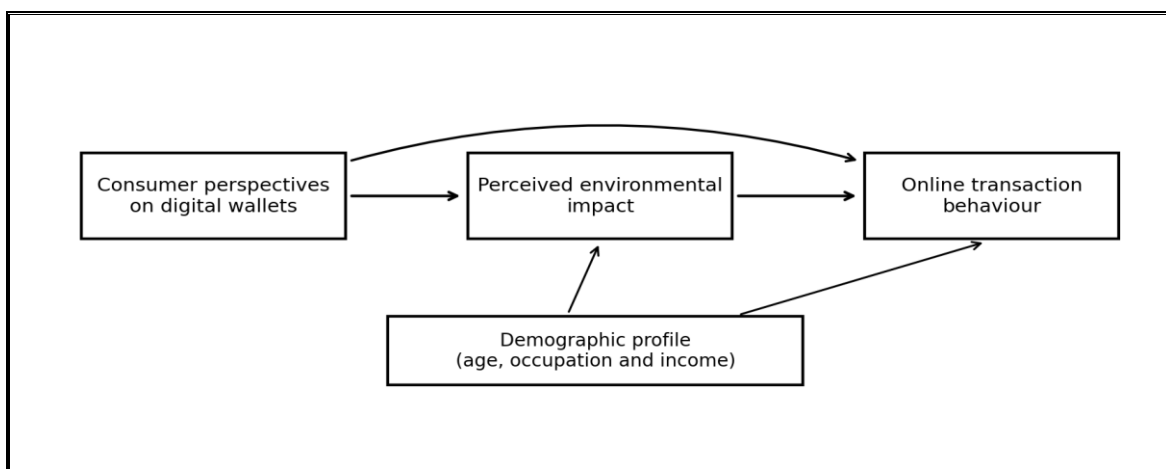


Figure 1. Conceptual framework of consumer perceptions, environmental impact and online transaction behaviour.

## RESEARCH METHODOLOGY

### Research design and study area

The study adopted a cross-sectional survey design. A cross-sectional design is appropriate because the study seeks to capture consumer perceptions and transaction-related behaviour at a specific point in time. The study was conducted in Tiruchirappalli

District, Tamil Nadu, India. Tiruchirappalli is an appropriate empirical setting because it includes a diverse consumer population, educational institutions, retail markets, service users and growing exposure to digital payment technologies. This combination makes the district useful for examining digital wallet adoption and sustainability perceptions outside a purely metropolitan context.

### 7.2 Sample and sampling procedure

The sample consisted of 458 respondents who had awareness of or experience with digital wallets used for online transactions. Respondents were selected using a combination of convenience sampling and stratified representation across key demographic categories such as age, occupation and income. Although probability sampling would improve generalisability, the mixed sampling approach helped the study include respondents from different consumer segments within the district. The sample size is adequate for the descriptive and multivariate analyses performed in the study.

### 7.3 Instrument and measurement

Primary data were collected through a structured questionnaire. The questionnaire covered demographic information, digital wallet usage, consumer perspectives, environmental concern, environmental factors influencing digital wallet choice and online transaction behaviour. Environmental concern was measured on a five-point response scale ranging from “not concerned at all” to “extremely concerned”. Environmental factor choice included reduction in paper waste, decrease in carbon emissions from transportation, lower energy consumption compared with traditional payment methods, use of renewable energy by the digital wallet provider and “none of the above”.

For construct-level analysis, consumer perspectives on digital wallets, perceived environmental impact and online transaction behaviour were treated as observed indices derived from the survey responses. The questionnaire was refined for clarity and relevance before full administration. In future extensions of this work, the instrument can be strengthened further through multi-item scale validation, confirmatory factor analysis and structural equation modelling.

### 7.4 Data collection and ethical considerations

Data were collected through online and face-to-face modes based on respondent accessibility and preference. Participation was voluntary, and respondents were informed that the information would be used only for academic research. No personally identifying information was required for the statistical analysis. The data were screened for completeness and consistency before analysis.

### 7.5 Data analysis strategy

The analysis proceeded in five stages. First, demographic characteristics were examined using percentage analysis. Second, a univariate test was used to examine whether demographic variables influenced environmental concern. Third, cross-tabulation and correspondence analysis were used to explore environmental consideration and factor preferences across demographic categories. Fourth, Pearson correlation was used to examine bivariate relationships among consumer perspectives, perceived environmental impact and online transactions. Fifth, multiple regression was used to test the predictive effect of consumer perspectives and perceived environmental impact on online transaction behaviour. The results were interpreted using conventional significance levels, with  $p < 0.05$  indicating statistical significance.

### 7.6 Measurement quality and analytical transparency

For transparent scholarly reporting, the analysis separates statistical significance from substantive importance. Inferential results are therefore accompanied by effect sizes and confidence intervals wherever the reported survey outputs permit such computation. This approach improves interpretation because large samples can produce statistically significant p-values even when practical effects are small.

The analysis follows an observed-variable approach. The variables used in the correlation and regression analyses are treated as composite indices/direct perception measures derived from the structured questionnaire rather than as latent variables estimated through structural equation modelling. Therefore, the robustness emphasis is placed on effect sizes, confidence intervals and transparent interpretation of the explanatory power of the model. Future studies using item-level multi-item scales may extend the analysis through confirmatory factor analysis and structural equation modelling.

**Table 1. Analytical quality controls used for methodological strengthening**

Quality control	Action taken in the revised manuscript
Construct definition	Consumer perspectives, perceived environmental impact and online transaction behaviour were retained as theoretically justified observed indices.
Effect-size reporting	Cramer's V, partial eta squared, confidence intervals and Cohen's f-squared are reported so that interpretation does not depend only on p-values.

Quality control	Action taken in the revised manuscript
Assumption transparency	Regression interpretation is bounded by the modest R-squared value and the cross-sectional nature of the data.
Psychometric limitation	The study uses observed composite/direct perception measures; latent-variable psychometric testing is recommended for future item-level scale development.

Source: Author computation based on the available survey outputs.

### 7.7 Additional analytical safeguards and transparency protocol

To make the analysis more rigorous, the study reports not only statistical significance but also substantive magnitude. The additional checks include one-sample ordinal diagnostics for environmental concern, chi-square effect sizes, confidence intervals for correlations and regression coefficients, partial f-squared statistics and an exploratory aggregate path assessment. This approach reduces over-reliance on p-values and clarifies the strength and limits of the evidence.

The study distinguishes between item-level measurement validation and aggregate-output robustness analysis. Because the reported results are based on summarized survey outputs, the analysis is restricted to statistics that can be derived transparently from the available tables and regression estimates. Future work with item-level data can extend the model using CFA or PLS-SEM to assess composite reliability, AVE, discriminant validity, common method bias and full collinearity diagnostics.

## RESULTS

### 8.1 Respondent profile

Table 2 reports the demographic profile of the respondents. The sample is dominated by younger and middle-aged consumers. Respondents aged 18-24, 25-34 and 35-44 together accounted for 77.3 per cent of the sample. The occupational profile was diverse, with full-time employees, part-time employees and students forming the largest categories. Monthly income was concentrated mainly in the below Rs. 60,000 range.

**Table 2. Demographic profile of respondents**

Variable	Category	Frequency	Percent
Age group	18-24	125	27.3
	25-34	113	24.7
	35-44	116	25.3
	45-54	61	13.3
	55 and above	43	9.4
	Total	458	100.0
Occupation	Student	120	26.2
	Employed (full-time)	135	29.5
	Employed (part-time)	131	28.6
	Self-employed	39	8.5
	Unemployed	33	7.2
	Total	458	100.0
Monthly income	Below 20,000	130	28.4
	20,000-40,000	126	27.5
	40,001-60,000	143	31.2
	Above 60,000	26	5.7
	Prefer not to disclose	33	7.2
	Total	458	100.0

Source: Primary data.

### 8.2 Environmental concern regarding digital wallet usage

The level of concern regarding the environmental impact of digital wallets was high. As shown in Table 3, only 13.6 per cent of respondents reported being either not concerned or slightly concerned, while 86.5 per cent reported being moderately, very or extremely concerned. This indicates that environmental awareness is not marginal among digital wallet users in the sample.

**Table 3. Concern about the environmental impact of digital wallets**

Concern level	Frequency	Percent	Cumulative percent
Not concerned at all	32	7.0	7.0
Slightly concerned	30	6.6	13.5
Moderately concerned	131	28.6	42.1
Very concerned	135	29.5	71.6
Extremely concerned	130	28.4	100.0

Concern level	Frequency	Percent	Cumulative percent
Total	458	100.0	

Source: Primary data.

### 8.3 Demographic differences in environmental concern

Table 4 presents the univariate test of environmental concern. The corrected model was statistically significant, indicating that the demographic variables collectively explained variation in concern levels. However, the individual effects require careful interpretation. Occupation and income were significant predictors of concern, whereas age was not significant. Therefore, the results support demographic variation in concern mainly through occupation and income, not through age in the univariate model.

**Table 4. Univariate test of demographic effects on environmental concern**

Source	Type III SS	df	Mean square	F	Sig.
Corrected model	209.374	104	2.013	1.751	.000
Intercept	1765.646	1	1765.646	1535.886	.000
Age	5.979	4	1.495	1.300	.270
Occupation	14.617	4	3.654	3.179	.014
Income	17.391	4	4.348	3.782	.005

Source: Primary data.

Note:  $R^2 = .340$ ; adjusted  $R^2 = .146$ .

### 8.4 Consideration of environmental impact when choosing a digital wallet

Table 5 shows the frequency with which respondents considered environmental impact while choosing a digital wallet. Across age groups, younger and middle-aged respondents more frequently reported “always”, “often” or “sometimes” considering environmental impact. Students and employed respondents showed comparatively higher consideration than self-employed and unemployed respondents. Income groups below Rs. 60,000 also showed stronger consideration patterns than the highest income group and the undisclosed income group.

**Table 5. Consideration of environmental impact while choosing a digital wallet**

Group	Always	Often	Sometimes	Rarely	Never	Total
Age: 18-24	31	39	30	14	11	125
Age: 25-34	32	32	37	5	7	113
Age: 35-44	32	41	33	5	5	116
Age: 45-54	11	16	9	10	15	61
Age: 55 and above	7	12	5	8	11	43
Occupation: Student	31	43	31	5	10	120
Occupation: Full-time employed	39	41	38	8	9	135
Occupation: Part-time employed	29	37	35	16	14	131
Occupation: Self-employed	5	11	6	6	11	39
Occupation: Unemployed	9	8	4	7	5	33
Income: Below 20,000	37	32	36	11	14	130
Income: 20,000-40,000	33	40	34	8	11	126
Income: 40,001-60,000	35	47	36	14	11	143
Income: Above 60,000	4	11	3	3	5	26

Group	Always	Often	Sometimes	Rarely	Never	Total
Income: Prefer not to disclose	4	10	5	6	8	33

Source: Primary data.

### 8.5 Environmental factors influencing digital wallet decisions

Table 6 presents the environmental factors influencing the decision to use a digital wallet across age groups. Reduction in paper waste was the most frequently selected factor overall, followed by lower energy consumption, renewable energy use by the provider and reduced transportation-related emissions. The correspondence analysis was statistically significant, indicating an association between age group and the environmental factor considered most influential. The result should be interpreted as exploratory because the strength of association, represented by total inertia, was modest.

**Table 6. Environmental factor influencing the decision to use a digital wallet by age group**

Environmental factor	18-24	25-34	35-44	45-54	55+	Total
Reduction in paper waste	47	48	51	12	9	167
Decrease in carbon emissions from transportation	16	22	25	11	11	85
Lower energy consumption compared to traditional payment methods	32	18	16	13	15	94
Use of renewable energy sources by the digital wallet provider	23	22	20	20	5	90
None of the above	7	3	4	5	3	22
Active margin	125	113	116	61	43	458

Source: Primary data.

**Table 7. Correspondence analysis summary**

Dimension	Singular value	Inertia / test result
1	.212	.045
2	.143	.020
3	.102	.010
4	.024	.001
Total		.076; Chi-square = 34.933; Sig. = .004

Source: Primary data.

### 8.6 Correlation analysis

Table 8 reports the correlation coefficients among consumer perspectives on digital wallets, perceived environmental impact and online transaction behaviour. All three correlations were positive and statistically significant at the 0.01 level. The association between perceived environmental impact and online transactions was the strongest among the three, although the overall effect sizes were modest.

**Table 8. Correlation analysis**

Variable	Consumer perspectives	Environmental impact	Online transactions
Consumer perspectives on digital wallets	1	.317**	.331**
Perceived environmental impact	.317**	1	.367**

Variable	Consumer perspectives	Environmental impact	Online transactions
Online transaction behaviour	.331**	.367**	1

Source: Primary data.

Note: \*\* Correlation is significant at the 0.01 level (two-tailed); N = 458.

### 8.7 Regression analysis

The multiple regression model examined whether consumer perspectives on digital wallets and perceived environmental impact predicted online transaction behaviour. As shown in Table 9, the model was statistically significant and explained 18.6 per cent of the variance in online transaction behaviour. Both predictors were positive and significant. The standardized coefficient for perceived environmental impact was slightly higher than that for consumer perspectives, suggesting that environmental perception has a meaningful role in explaining online transaction behaviour within the model.

**Table 9. Regression model summary and ANOVA result**

Statistic	Value
Model R	.431
R Square	.186
Adjusted R Square	.182
Std. error of estimate	.80200
F	51.874
Sig.	.000

Source: Primary data.

**Table 10. Regression coefficients predicting online transaction behaviour**

Predictor	B	Std. error	Beta	t	Sig.
Constant	1.876	.228		8.231	.000
Consumer perspectives on digital wallets	.237	.044	.238	5.341	.000
Perceived environmental impact	.308	.047	.291	6.535	.000

Source: Primary data.

Dependent variable: Online transaction behaviour.

### 8.8 Additional robustness, effect-size and confidence-interval analysis

Additional diagnostic statistics were computed from the aggregate tables and regression outputs available in the manuscript. These tests strengthen the interpretation by showing the magnitude and precision of the relationships, not merely whether the p-values are statistically significant.

**Table 11. Chi-square robustness tests and Cramer's V effect sizes**

Association tested	Chi-square	df	p-value	Cramer's V	Interpretation
Age group x environmental consideration	54.719	16	< .001	0.173	Small-to-moderate association
Occupation x environmental consideration	37.359	16	.002	0.143	Small association
Income x environmental consideration	24.031	16	.089	0.115	Small; not significant at 5%
Age group x environmental factor selected	34.933	16	.004	0.138	Small association

Source: Author computation from the cross-tabulation and correspondence tables. Note: Cramer's V values around .10, .30 and .50 may be read as small, medium and large benchmarks depending on table dimensions and research context.

The robustness tests indicate that age group and occupation are significantly associated with the frequency of environmental consideration when choosing a digital wallet. Income shows only a small and statistically non-significant association with

environmental consideration. The association between age group and the environmental factor selected is significant but small, which is consistent with the correspondence analysis result.

**Table 12. Univariate effect-size diagnostics for environmental concern**

Predictor	Type III SS	df	F	p-value	Partial eta squared	Interpretation
Age	5.979	4	1.300	.270	0.015	Not significant; very small effect
Occupation	14.617	4	3.179	.014	0.035	Significant; small effect
Income	17.391	4	3.782	.005	0.041	Significant; small effect

*Source: Author computation from the univariate test table. Note: Partial eta squared values suggest small practical effects even where p-values are statistically significant.*

The univariate robustness diagnostics refine the original interpretation. Occupation and income are statistically significant predictors of environmental concern, but their effect sizes are small. Age is not statistically significant in the univariate model and should not be interpreted as a direct predictor of environmental concern.

**Table 13. Correlation confidence intervals**

Relationship	r	95% CI lower	95% CI upper	p-value	Interpretation
Consumer perspectives - Environmental impact	.317	.232	.397	< .001	Positive, moderate association
Consumer perspectives - Online transactions	.331	.247	.410	< .001	Positive, moderate association
Environmental impact - Online transactions	.367	.285	.444	< .001	Positive, moderate association

*Source: Author computation using Fisher’s z transformation based on N = 458.*

The confidence intervals confirm that all three bivariate relationships are positive and statistically reliable. However, the intervals remain in the low-to-moderate range, indicating meaningful but not strong relationships.

**Table 14. Regression coefficient confidence intervals and effect-size diagnostics**

Predictor	B	SE	95% CI lower	95% CI upper	t	p-value	Partial f-squared
Constant	1.876	.228	1.428	2.324	8.231	< .001	-
Consumer perspectives on digital wallets	.237	.044	.151	.323	5.341	< .001	.063
Perceived environmental impact	.308	.047	.216	.400	6.535	< .001	.094

*Source: Author computation from the regression coefficient table. Model-level Cohen’s f-squared = .229, indicating a medium explanatory effect for the overall model. R<sup>2</sup> = .186; adjusted R<sup>2</sup> = .182.*

The regression diagnostics show that both consumer perspectives and perceived environmental impact have positive confidence intervals that do not cross zero. Perceived environmental impact has the larger standardised beta and partial f-squared value, indicating that environmental evaluation contributes more strongly to online transaction behaviour than general consumer perspective within this model. At the same time, the model explains 18.6 per cent of the variance, which means that other behavioural and technology-adoption variables should be included in future models.

**8.9 Aggregate path and exploratory indirect-effect assessment**

An additional aggregate path assessment was performed using the reported correlation matrix and standardized regression

coefficients. This test is not a substitute for item-level SEM; rather, it is a consistency check that clarifies whether perceived environmental impact functions as a partial mechanism linking consumer perspectives with online transaction behaviour.

**Table 15. Aggregate path and exploratory indirect-effect assessment**

Path / statistic	Estimate	Interpretation
Consumer perspectives -> perceived environmental impact (a path)	.317	Positive association; consumers with favourable wallet evaluations also perceive stronger environmental value
Consumer perspectives -> online transaction behaviour, controlling for environmental impact	.239	Positive direct effect
Perceived environmental impact -> online transaction behaviour, controlling for consumer perspectives	.291	Positive direct effect; stronger than consumer perspective
Indirect effect: consumer perspectives -> environmental impact -> online transactions	.092	Exploratory indirect effect from aggregate outputs
Total effect of consumer perspectives on online transaction behaviour	.331	Low-to-moderate total association
Variance accounted for by indirect path	27.9%	Suggests partial, not full, mediation
Approximate Sobel z for indirect path	4.82, $p < .001$	Aggregate approximation only; bootstrap mediation requires raw data

**Source:** Author computation from the reported correlation matrix and regression coefficients. **Note:** Estimates are based on aggregate outputs and should be interpreted as exploratory mediation evidence rather than item-level SEM evidence.

The aggregate assessment supports the theoretical argument that environmental perception is not merely an outcome of digital wallet evaluation but may act as a partial behavioural mechanism. The mediated component accounts for about 27.9 per cent of the total consumer-perspective effect, indicating that functional approval of wallets is associated with transaction behaviour partly through perceived environmental value.

### 8.10 Substantive concern and ordinal robustness diagnostics

The ordinal concern item was further assessed against the neutral midpoint of the five-point scale. The mean concern score was 3.657 (SD = 1.160), significantly above the neutral value of 3.00,  $t(457) = 12.12$ ,  $p < .001$ , with a medium effect size (Cohen’s  $d = .566$ ). In practical terms, 57.9 per cent of respondents reported being either very concerned or extremely concerned about the environmental impact of digital wallets.

**Table 16. Substantive concern and ordinal robustness diagnostics**

Diagnostic	Estimate	95% CI / p-value	Interpretation
Mean environmental concern	3.657	95% CI: 3.551 to 3.764	Above the neutral midpoint
One-sample t-test against neutral midpoint	$t(457) = 12.12$	$p < .001$	Concern is statistically higher than neutral
Cohen’s d for concern	.566	Medium practical effect	Environmental concern is substantively meaningful
Very/extremely concerned respondents	57.9%	Descriptive proportion	Majority reported high concern
High environmental consideration: 18-44 vs 45+	OR = 1.78	95% CI: 1.14 to 2.76; $p = .011$	Younger/middle-aged respondents were more likely to frequently consider environmental impact
High consideration: students/employed vs self/unemployed	OR = 1.57	95% CI: 0.94 to 2.60; $p = .082$	Directionally positive but not statistically strong
High consideration: income $\leq 60,000$ vs above / undisclosed	OR = 1.32	95% CI: 0.77 to 2.29; $p = .315$	No strong grouped income effect

**Source:** Author computation from the reported frequency and cross-tabulation outputs.

These diagnostics improve the practical interpretation of the results. The sample is not only statistically associated across constructs; it also shows a meaningful level of concern above neutrality. At the same time, the odds-ratio diagnostics prevent

overstatement by showing that some segment differences are directional rather than statistically decisive.

## DISCUSSION

The findings show that consumers in the study area are not indifferent to the environmental implications of digital wallet usage. A substantial majority reported at least moderate concern, which suggests that sustainability has begun to enter consumer thinking even in routine digital payment decisions. This matters because payment choices are usually framed around speed, convenience and security, yet the evidence indicates that environmental meaning can also be attached to digital finance.

The demographic results add nuance to this finding. Occupation and income were significant in explaining environmental concern, whereas age was not significant in the univariate model. This suggests that work exposure, consumption capacity and socioeconomic context may be more influential than age alone in shaping how consumers interpret the environmental consequences of digital wallet use.

The cross-tabulation and correspondence analysis show that reduction in paper waste is the most salient environmental factor for consumers. This is understandable because paperless receipts and reduced cash handling are visible and easy for consumers to associate with digital payments. In contrast, data-centre energy use, device production or renewable-energy sourcing by providers are less visible and may require stronger consumer education. Digital wallet providers can therefore begin with clear paperless and receipt-management features while gradually communicating deeper sustainability practices such as renewable energy use, responsible data infrastructure and e-waste reduction partnerships.

The positive correlations among consumer perspectives, perceived environmental impact and online transaction behaviour indicate that functional acceptance and sustainability perception move in the same direction. Consumers who view digital wallets positively also tend to perceive environmental benefits and report stronger online transaction behaviour. The regression results reinforce this pattern by showing that perceived environmental impact retains a positive predictive role even after consumer perspective is included in the model.

Overall, the study suggests that environmental impact can be integrated into digital wallet adoption research as a relevant perceptual variable. The results do not establish causality because the design is cross-sectional, but they provide evidence that sustainability perception is linked with online transaction behaviour and deserves a more visible position in digital payment models.

The central theoretical implication is that green digital finance should be studied as a perception-behaviour system. Digital wallets may produce objective environmental gains only under specific infrastructure, energy and lifecycle conditions; however, consumer adoption decisions are shaped by perceived environmental

value, trust, convenience and social learning. The results therefore separate objective sustainability claims from subjective sustainability evaluations and show that the latter are behaviourally relevant even when the empirical model is conservative.

Alternative explanations should also be considered. Respondents who are generally favourable toward digital technologies may simultaneously report higher online transaction behaviour and more favourable environmental perceptions. The positive relationships observed here should therefore be read as association-based evidence. Future research using longitudinal designs, experimental sustainability labels or item-level SEM can better establish causality and rule out common positive-response tendencies.

## Implications

### 10.1 Theoretical implications

The study extends digital wallet adoption research by linking consumer perspectives with perceived environmental impact. It shows that sustainability can be examined not only as a macro-level policy issue but also as a consumer-level perception associated with online transaction behaviour. By combining technology acceptance logic with green consumer behaviour reasoning, the study provides a foundation for future research on green digital finance adoption. The results also suggest that demographic factors should be examined selectively, as not all demographic variables exert the same influence on environmental concern.

### 10.2 Managerial implications

Digital wallet providers can use the findings to design sustainability-sensitive communication and product features. Because reduction in paper waste is the most visible environmental benefit for respondents, providers may emphasise paperless receipts, digital statements and reduced physical documentation. At the same time, communication should avoid overstating environmental claims unless supported by credible data on energy use, infrastructure and lifecycle impact.

Marketing strategies should be segmented. Students and employed consumers appear more responsive to environmental considerations, while self-employed and unemployed groups may require communication that combines environmental benefits with cost, convenience and trust. Income-based segmentation is also relevant because environmental concern and digital wallet choice considerations differed across income groups.

### 10.3 Policy implications

Policymakers can support environmentally responsible digital finance by encouraging paperless transaction records, responsible digital infrastructure and transparent sustainability disclosures by payment service providers. Public awareness campaigns may also help consumers understand both the benefits and limits of digital payment

sustainability, especially where environmental claims are simplified into marketing messages.

### Limitations and Future Research

This study has limitations that should be acknowledged. First, the research is based on cross-sectional data, and therefore causal conclusions cannot be drawn. Second, the sample is restricted to Tiruchirappalli District, which limits the generalisability of the findings to other regions. Third, the model explains 18.6 per cent of the variance in online transaction behaviour, indicating that other important predictors remain outside the present model. Fourth, the study relies on self-reported perceptions rather than actual transaction or carbon-emission data.

Future research can address these limitations in several ways. Researchers can collect longitudinal data to examine whether environmental concern changes over time as consumers gain more digital payment experience. Comparative studies across metropolitan, tier-II and rural markets can improve external validity. Future studies can also incorporate additional variables such as perceived usefulness, perceived ease of use, trust, perceived risk, digital literacy, incentives, social influence and perceived green value. Finally, structural equation modelling using validated multi-item scales would provide a stronger test of the relationships among technology acceptance, environmental concern and digital wallet usage.

### CONCLUSION

Digital wallets are reshaping consumer payment behaviour, but their sustainability implications require greater empirical attention. This study examined consumer perspectives on the environmental impact of digital wallets in online transactions using data from 458 respondents in Tiruchirappalli District. The results show that environmental concern is relatively high, with most respondents reporting moderate to extreme concern. Occupation and income significantly influenced concern levels, while age did not show a significant effect in the univariate model. Reduction in paper waste was the most influential environmental factor, indicating that consumers primarily recognise the visible and immediate environmental benefits of digital wallets.

The correlation and regression results demonstrate that favourable consumer perspectives and perceived environmental impact are positively associated with online transaction behaviour. Although the explanatory power of the regression model is modest, the findings confirm that environmental perception deserves a place in digital wallet adoption research. For digital wallet providers and policymakers, the study highlights the need to integrate environmental responsibility into product design, consumer communication and digital finance regulation. The expansion of cashless payments should be pursued not only as a matter of convenience and efficiency but also as part of a broader movement toward responsible and sustainable digital commerce.

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