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Research Article

Unveiling Consumer Attitude and Intentions Toward Refurbished Mobile Phones

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ABSTRACT

This study investigates the determinants of consumer intentions to purchase refurbished mobile phones, with a focus on the influence of psychological factors and socio-demographic moderators. Grounded in the Theory of Planned Behavior (TPB). Data was collected from 689 valid respondents in Bangalore using a structured questionnaire. Structural Equation Modeling (SEM) was employed to evaluate the conceptual framework, demonstrating good model fit (RMSEA = 0.068, CFI = 0.947, GFI = 0.909). The results indicate that privacy concerns ($\beta = 0.358$, $p < 0.001$) and willingness to pay ($\beta = 0.182$, $p < 0.001$) are the strongest predictors of purchase intention, followed by attitude, subjective norms, perceived control and product knowledge. Moderation analysis reveals that younger consumers are more influenced by social norms ($p = 0.048$), lower-educated consumers exhibit greater privacy concerns ($p = 0.031$) and higher income groups show stronger willingness to pay ($p = 0.040$). Gender showed no significant effect. The results show the need for targeted strategies that address demographic-specific barriers and motivators, including cost-value communication and enhanced data security assurances.

Keywords: Mobile Phones, Theory of Planned Behavior, Refurbished.

Introduction

Consumer response on mobile phones manufactured with recycled materials and e-waste management is shaped by psychological, demographic and contextual influences. The Theory of Planned Behavior (TPB) consistently underscores the importance of key factors like the attitude, subjective norms and perceived behavioral control that influences the consumer decision towards environmentally responsible purchase [1], [2]. Additional factors such as privacy concerns, willingness to pay, environmental awareness, and moral norms have been also examined. Notably, while privacy concerns often deter engagement with refurbished or recycled products, transparent data handling and communication can foster trust and contribute positively towards recycling. [3], [4]. International studies reveal significant disparities in e-waste disposal behaviors. Consumers in developing nations often retain or dispose used mobile phones informally, whereas individuals in developed nations are more likely engage to dispose used mobiles through formal recycling systems [5]. Interdisciplinary research carried out in countries such as China, India, Germany and Sweden are based on factors like are economics, psychology and environmental science in order to motivate behavioral barriers towards e-waste management [6], [7]. Key factors influencing the acceptance of recycling and refurbished are based on convenience, risk perception, product knowledge and past experience. All of these influence the adoption of refurbished in electronics [8], [9]. However, significant gaps in research remain, especially in understanding the role of privacy, gender-based behavior differences and the influence of the informal recycling sector [10].

Methodology

Factors that was considered in this study are outlined brieflyin this section.

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Influencing Factors and Hypotheses

A. Attitude (AT)

Attitude reflects the consumer's overall response to the refurbished products. It is shaped by perception of quality, performance and value. Positive attitude is driven by cost savings and environmental benefits, which enhance intention of purchase of such products. Negative attitudes are linked to either quality concerns or social stigma deter the purchase of products based on recycling. Consumers with a positive attitude towards refurbished products are more likely to exhibit higher intention to purchase such products.

Hypothesis (H1): A positive attitude towards refurbished products encourages recycle and remanufacture those products.

B. Perceived Behavioral Control (PBC)

Perceived behavioral control refers to a consumer's confidence in their ability to access and use refurbished Phones. It is influenced by factors like cost, availability and ease of use. Higher perceived control boosts purchase intention, while limited access or information can discourage purchase of it.

Hypothesis (H2): Greater perceived behavioural control over refurbished products encourages recycle and remanufacture these products.

C. Subjective Norm (SN)

Subjective norm refers to the social pressure on individuals from family, friends or society towards the individual's behavior, such as purchasing refurbished phones. Positive reinforcement from peers or societal trends can positively encourage purchase intentions of recycled products, while negative perceptions or disapproval of such products may hinder refurbished. Social approval, especially in the context of environmental responsibility, plays a key role in shaping consumer behavior.

Influence on Purchase Intention: If a significant percentage of the society view refurbished products favorably it will result in a higher intention to remanufacture, as they conform to the perception of the society.

Hypothesis (H3): Positive subjective norm regarding refurbished products are positively associated with the intention to remanufacture these products.

D. Privacy Concern (PC)

Privacy concerns refer to the customer's apprehensions about the security of personal data during transactions leading to remanufacture the products. These include fear of identity theft, data breaches and misuse of information in the residual data on such recycled devices and inadequate steps taken by recyclers and those who manufacture recycled products or the intermediates. In order to build trust and encourage purchases of recycled products, companies must have transparent data protection policies and implement robust cybersecurity practices.

Influence on Purchase Intention: Consumers with high privacy concerns may exhibit a lower response to recycling of products due to fear of potential risks associated with unprotected personal information.

Hypothesis (H4): Privacy concerns are negatively associated with the motivation to remanufacture products.

E. Product Knowledge (PK)

Product knowledge refers to a consumer's understanding of refurbished mobile phones their features, benefits and how they differ from similar new products.

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Influence on Purchase Intention: Consumers with greater knowledge about refurbished products are more likely to have a positive attitude and a higher support to remanufacture and recycling as they will be confident in their decision-making.

Hypothesis (H5): Good knowledge about refurbished products and recycling is positively associated with their support to remanufacture these products.

F. Willingness to Pay (WP)

Willingness to pay (WTP) refers to the maximum amount consumers are ready to spend on refurbished mobile phones compared to new ones.

Influence on Purchase Intention: A higher willingness to pay indicates a stronger intention to remanufacture, as consumers perceive refurbished products have good value for money and environment friendliness.

Hypothesis: H6: A higher willingness to pay for refurbished products is positively influence the decision to remanufacture these products.

G. Intention Towards Refurbished (IR)

It reflects readiness for sustainable consumption and is shaped by perceived value, quality, environmental benefits and social influence.

Influence on Purchase Behavior: Stronger intentions towards refurbished are likely to result in actual refurbished behavior, where consumers act on their plans and purchase refurbished products.

Data Collection Method

The framework is the connection between the factors described above, to show the relationship with each other. The framework is shown in Fig 2.1. We can observe that SN, PC, PBC, PK and WP are connected to both AT and IR, this is because the AT of a user can change the IR by influence of other factors.

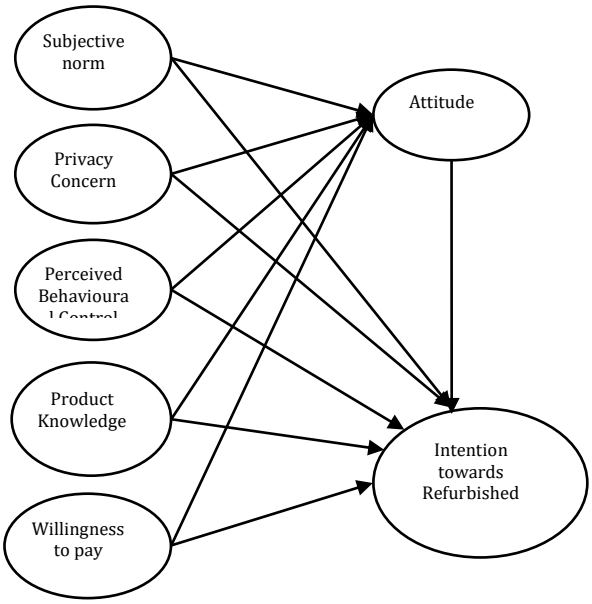

Fig 3.1: Framework relation between variables

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Data was collected through an online survey using emails and on social media platforms. The questionnaire was comprised of close-ended questions, utilizing Likert scales to measure parameters such as attitudes, perceived behavioural control, societal norms, privacy concerns, product knowledge, willingness to pay and intention towards refurbished.

i. Measures

The constructs was based on certified scales from previous research, with necessary modifications to fit the context of refurbished products. The responses are rated on a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The validity and reliability of the scales was tested through a pilot study with 50 respondents before the main data collection.

ii. Analysis Techniques

Data was analyzed using SEM to test the suggested model and hypotheses. SEM is used for its capability to assess intricate relationships between various factors simultaneously and to validate the measurement model and structural model. The analysis was conducted using AMOS software, following a two-step approach by first assessing the measurement model for its reliability and validity, next by testing the structural model to evaluate the hypothesis.

iii. Ethical Considerations

The review had complied with moral rules by getting educated consent from all respondents, guaranteeing the secrecy of their reactions and giving the choice to pull out from the study whenever they wish. Moral endorsement were assessed with the consent from the institutional audit board before processing the information.

iv. Data and Methods

An extensive questionnaire was designed and administered to validate the conceptual model. The main part of the questionnaire is divided into 8 parts. The initial section focuses on collecting control variables including gender, age, monthly income and education level. Each section contains three questions designed to measure the respective constructs. The questions topic used are shown in Table 3.1.

In the analysis, items were selected based on their factor loadings and only items with loadings greater than 0.5 were included. This ensured that the selected items had strong correlations with the constructs they were intended to measure, thus increasing the reliability and validity of the data.

TABLE 3.1: MEASUREMENT INSTRUMENTS FOR THE LATENT VARIABLES OF THE HYPOTHETICAL MODEL.

Variable Dimension	Serial Number/ Item	Questionnaire topic design
Attitude	AT1	Purchasing a new refurbished mobilephone.
	AT2	Do you think refurbished reduces e-waste?
	AT3	What is your perception of quality of refurbished products as compared to new products?
Subjective norm	SN1	My friends encourage me to buy refurbished mobile.
	SN2	People whom I value high speak positively about it.
	SN3	I'm highly influenced by my friends buying behavior.
Perceived behavioral	PBC1	I'm confident in buying refurbished phone.

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control	PBC2 PBC3	It is easy for me to buy refurbished mobile. I have necessary knowledge to buy refurbished phone.
Privacy concern	PC1 PC2 PC2	How concerned are you about your data? Do you have privacy concerns while buying refurbished phone. Concern related to privacy concern with regard to warranty
Product knowledge	PK1 PK2 PK3	Do you differentiate between a new and refurbished product? Benefits of buying refurbished phones. Awareness about refurbished phones.
Willingness to Pay	WP1 WP2	Willing to pay more that comes with testing. Cost saving as a factor in buying refurbished phone.
Intention to remanufacture	IR1 IR2	Likely to buy a product that comes comes with 1-year warranty. I am inclined towards buying refurbished phone.

v. Measurement Model

The underlying model was determined utilizing the AMOS 26.0 programming and the SEM utilized in this review. The connection between inactive factors was assessed utilizing the primary model. The connection between inert factors and noticed factors was found utilizing the estimation model. The advantages of factual strategies like numerous relapses, factor examination and way examination are joined in SEM.

The model utilizing greatest probability assessment, Maximum Likelihood Estimation (MLE) and survey the general impacts of every indicator variable on the endogenous factors utilizing the product AMOS. In rundown, there are three stages engaged with the underlying condition model utilized in this review: (1) reliability and validity testing of review information;(2) confirmatory factor analysis (CFA) to survey the viability of the deliberate construction; (3) model assessment.

vi. Statistical Sample

There was 689 valid responses to the poll study out of 736 all out reactions which has 93.6% response rate and were utilized for the measurable analysis. The socio-demographic qualities are displayed in Table 3.2.

TABLE 3.2: DISTRIBUTION OF THE SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLES

Characteristics		**Recurrence**	**Extent (%)**
Gender	Male	481	69.81
	Female	208	30.19
Age	16-24	349	50.65
	25-34	127	18.43

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	35-44	117	16.98
	45-54	63	9.14
	55-64	21	3.04
	>65	12	1.76
Education level	Intermediate or below	72	10.45
	Under graduate	266	38.60
	Graduate	196	28.45
	Postgraduate	155	22.5
Family monthly income	0-20000	305	44.26
	100000–500000	241	35
	500000-1000000	79	11.46
	>1000000	64	9.28
Number of Obsolete phones	1	354	51.37
	2	185	26.85
	3	95	13.79
	4 and above	55	7.99

The initial assessment results are illustrated in Figure 3.1. The model follows the pathway of "perception to decision," highlighting the role of consumer cognition in shaping behavioral intentions. Notably, attitude is found to be significantly linked with other variables, influencing consumers' overall intention toward refurbished products.

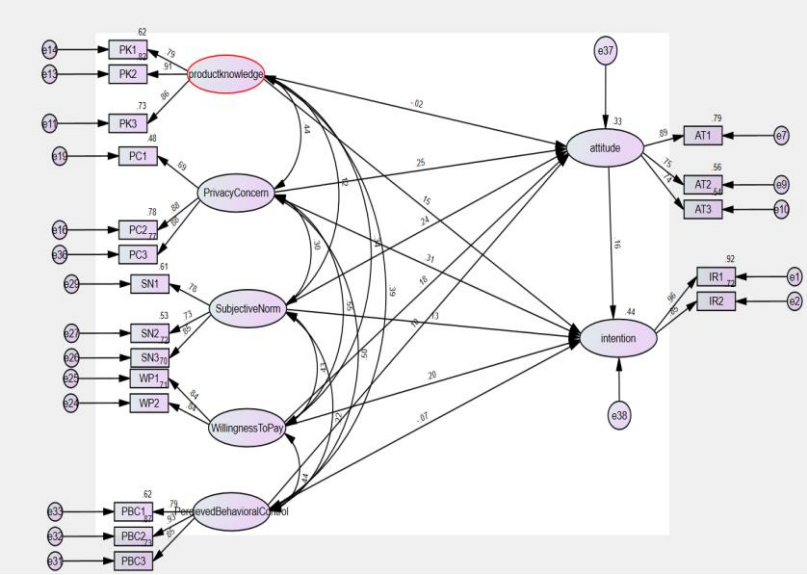

Fig 3.2 Structural Model

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The measurement model's reliability and validity were evaluated using Composite Reliability (CR), Average Variance Extracted (AVE) and Cronbach's Alpha. All CR values exceeded 0.8, indicating strong internal consistency and surpassing the acceptable threshold of 0.6. Convergent validity was confirmed through AVE values ranging from 0.620 to 0.740, all above the minimum benchmark of 0.5. Additionally, Cronbach's Alpha values for the six latent constructs ranged from 0.828 to 0.893, exceeding the standard threshold of 0.6, further supporting the model's reliability. Overall, the model demonstrates sound reliability and convergent validity.

TABLE 3.3: THE VALUES OF RELIABILITY AND VALIDITY OF THE ESTIMATION MODEL.

Variables	**Sl.No**	**Factor Load(λ)**	**Cronbach Alpha**	**CR**	**AVE**
Attitude	A1	0.890	0.834	0.836	0.632
	A2	0.747			
	A3	0.738			
Subjective norm	SN1	0.784	0.828	0.830	0.620
	SN2	0.727			
	SN3	0.846			
Perceptual behaviour control	PBC1	0.789	0.893	0.895	0.740
	PBC2	0.932			
	PBC3	0.855			
Product Knowledge	PK1	0.788	0.885	0.888	0.726
	PK2	0.907			
	PK3	0.857			
Privacy Concern	PC1	0.692	0.854	0.861	0.677
	PC2	0.884			
	PC3	0.878			
Willingness To Pay	WP1	0.838	0.868	0.829	0.708
	WP2	0.845			

The square root of latent variable's AVE should be more than the relationships between the variable and different factors in the concentrate to fulfill the rules for discriminant validity. In the Table3.3, the square root upsides of the AVEs make up the slanting components, and the Pearson relationship coefficients between the develops make up different components. For instance, the square base of the AVEs of SN and PBC are 0.787 and 0.860, which is more than the connection 0.223. It exhibits that the two inert factors have adequate discriminant validity. The review's idle variable AVEs square roots are bigger than the relationships between any of the parts in the Table 3.4. Accordingly, the discriminant validity of the estimation model is satisfactory.

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TABLE 3.4: DISCRIMINANT VALIDITY TEST

Latent Variable	AT	SN	PBC	PK	PC	WP
Attitude (AT)	0.795					
Subjective norm (SN)	0.410	0.787				
Perceptual behaviour control (PBC)	0.351	0.223	0.860			
Product Knowledge (PK)	0.380	0.116	0.388	0.852		
Privacy Concern (PC)	0.461	0.295	0.500	0.438	0.823	
Willingness To Pay (WP)	0.457	0.428	0.440	0.342	0.548	0.841

Structural Model

Model Fit Evaluation

Model fit was assessed using absolute, incremental and parsimony fit indices.

- Absolute Fit: The chi-square/df = 4.159 falls within the acceptable range (3–5). GFI = 0.909 (>0.9), SRMR = 0.026, and RMR = 0.0351—all indicating a satisfactory fit. RMSEA = 0.068, which is also within acceptable limits.
- Incremental Fit: NFI = 0.932, CFI = 0.947, and RNI = 0.911—all above the threshold of 0.9—suggesting a good model fit.
- Parsimony Fit: Higher values in PNFI and AGFI indicate better fit, though AGFI is typically lower than GFI due to model complexity. PNFI is widely accepted for assessing parsimony. Based on the results (Table 3.5), the model demonstrates an adequate overall fit.

TABLE 4.1: MODEL FIT.

Model Test Type	Fit Goodness	Observed Value of fit	Standard Value
Absolute fit	χ^2/df GFI RMSEA	4.159 0.909 0.068	3.00-5.00 >0.90 <0.08
	RMR	0.0351	<0.05
	SRMR	0.026	<0.05
Incremental fit	NFI CFI	0.932 0.947	>0.90 >0.90
	RNI	0.911	>0.90
Parsimony fit	AGFI PNFI	0.905 0.714	>0.90 >0.50

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Following confirmation of an acceptable model fit, structural model analysis was conducted to test the proposed hypotheses. The structural model utilizes validated constructs from the measurement model as inputs. Regression paths were established between independent and dependent variables, as depicted in the conceptual framework (Figure 4.1). Maximum Likelihood Estimation (MLE) was employed for parameter estimation. The analysis produced standardized path coefficients (β), p-values and significance levels, which were interpreted to assess hypothesis support. Detailed results are presented in Table 4.2.

TABLE 4.2: HYPOTHESES TABLE.

Hypotheses	β	t	p	Decision
H1: AT→ IR	0.118	3.596	***	Supported
H2: SN →IR	0.108	3.270	0.001	Supported
H3: PBC →IR	0.043	1.862	0.042	Supported
H4: PK →IR	0.117	3.897	***	Supported
H5: PC →IR	0.358	6.310	***	Supported
H6: WP →IR	0.182	4.068	***	Supported

Note: *** p < 0.001.

From the above table we can observe that all the hypothesis are supported because the p-value is greater than 0.05.

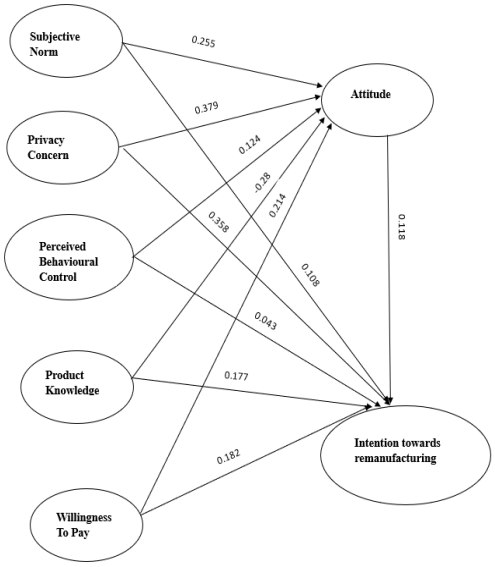

Fig 4.1 Result of Structural Model

ANALYSIS

H. *Moderation analysis*

After evaluating the hypotheses and obtaining the results, the study further examines the moderating effect of socio-demographic characteristics on the intention toward refurbished. The analysis investigates the significance of key factors across demographic segments. A post hoc Tukey test was conducted using SPSS 29.0.0 to perform pairwise comparisons among six variables: Attitude (AT), Subjective Norms (SN), Perceived Behavioral Control (PBC), Perceived Knowledge (PK), Perceived Consequences (PC) and Willingness to Pay (WP). The impact of these variables was analyzed across

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four socio-demographic groups: (i) Age, (ii) Gender, (iii) Education and (iv) Income, identifying which factors are most influenced within each group.

Results of Effect of Consumer's Age on Refurbished Intention

Before conducting the post hoc Tukey tests, a test of homogeneity of variances was performed to account for variability across groups. The results confirmed that variances were homogeneously distributed, as the significance level for the homogeneity test was p = 0.078 (> 0.05), indicating no significant difference in error variance across groups. Subsequently, pairwise comparisons using post hoc Tukey tests were conducted for the relevant variables, with detailed results presented in Table 5.1.

TABLE 5.1: RESULTS FOR THE IMPACT OF AGE.

Latent Variable	F	df	Significance
Attitude (AT)	0.586	688	0.557
Subjective norm (SN)	3.264	688	0.043
Perceptual behaviour control (PBC)	2.167	688	0.115
Product Knowledge (PK)	0.686	688	0.504
Privacy Concern (PC)	0.679	688	0.508
Willingness To Pay (WP)	1.265	688	0.283

The age variable impacts the Subjective Norm, as per the post hoc Tukey tests (p = 0.048< 0.05), in Table 5.2. The results show that Bangalore's youth consumers (below 30) will effectively partake in refurbished more than Bangalore's older consumers (above 30).

TABLE 5.2: THE RESULT OF POST HOC TUKEY TESTS ON THE IMPACT OF CONSUMER'S AGE.

Dependent Variable	(I) Category	(J) Category	Average Difference (I-J)	Significance
Subjective norm	under 30	above 31	0.396	0.048

Results of Effect of Consumer's Gender on Refurbished Intention

An independent t-test was conducted to examine differences between male and female respondents, given the strong influence observed for gender-related factors. As shown in Table 5.3, the results indicate that gender has a statistically significant impact on refurbished intention, with the p-value falling below the 0.05 significance threshold. This suggests that gender meaningfully influences consumer attitudes toward refurbished products.

TABLE 5.3: T-TEST ANALYSIS RESULTS FOR THE IMPACT OF CONSUMER'S GENDER.

Latent Variable	t	df	Significance
Attitude (AT)	1.718	688	0.180
Subjective norm (SN)	0.113	688	0.893
Perceptual behaviour control (PBC)	0.925	688	0.397
Product Knowledge (PK)	2.261	688	0.062
Privacy Concern (PC)	1.586	688	0.205
Willingness To Pay (WP)	0.099	688	0.906

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Results of Effect of Consumer's Education Level on Refurbished Intention

The findings, presented in Table 5.4, reveal a statistically significant difference between the independent variable of consumer education and privacy concern, with a p-value of 0.036 (< 0.05). The homogeneity of variances was confirmed through a variance uniformity test, where the significance value was p = 0.072 (> 0.05), indicating that the assumption of equal variances holds. For factors identified as significant, pairwise comparisons were conducted, and the detailed results are also presented in Table 5.4.

TABLE 5.4: RESULTS FOR THE IMPACT OF EDUCATION.

Latent Variable	F	df	Significance
Attitude (AT)	1.052	688	0.350
Subjective norm (SN)	0.200	688	0.819
Perceptual behaviour control (PBC)	1.743	688	0.176
Product Knowledge (PK)	2.263	688	0.063
Privacy Concern (PC)	4.012	688	0.036
Willingness To Pay (WP)	1.993	688	0.137

The post hoc Tukey test results, presented in Table 5.5, indicate a significant difference in Privacy Concern based on education level (p = 0.031 < 0.05). Specifically, consumers in Bangalore with education levels below graduation exhibit greater privacy concerns toward refurbished compared to those with higher (above graduation) educational qualifications.

TABLE 5.5: THE TEST RESULT OF POST HOC TUKEY TESTS ON THE IMPACT OF EDUCATION LEVEL.

Dependent Variable	(I) Category	(J) Category	Average Difference (I-J)	Significance
Privacy Concern	Below Graduation	Above Graduation	0.362	0.031

Impact of Income on Willingness to Pay

The analysis results, as shown in Table 5.6, indicate that the Willingness to Pay sub-dimension significantly varies across different income groups, with a p-value of 0.041 (< 0.05). The assumption of homogeneity of variances is satisfied, as the variance uniformity test yielded a p-value of 0.624 (> 0.05). For the factors found to be significant, pairwise comparisons were conducted and detailed in Table 5.6.

TABLE 5.6: RESULTS FOR THE IMPACT OF INCOME.

Latent Variable	F	df	Significance
Attitude (AT)	0.731	688	0.482
Subjective norm (SN)	0.401	688	0.670
Perceptual behaviour control (PBC)	0.219	688	0.804
Product Knowledge (PK)	0.396	688	0.673
Privacy Concern (PC)	0.126	688	0.862
Willingness To Pay (WP)	1.324	688	0.041

Post Hoc Analysis of Willingness to Pay by Income Level

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The post hoc Tukey test results, shown in Table 5.7, reveal a significant relationship between consumer income and Willingness to Pay ($p = 0.040 < 0.05$). The findings indicate that consumers in Bangalore with lower incomes (below ₹500,000) are more willing to pay for refurbished products compared to those with higher incomes (above ₹500,000).

TABLE 5.7: THE TEST RESULT OF POST HOC TUKEY TESTS ON THE IMPACT OF EDUCATION LEVEL.

Dependent Variable	(I) Category	(J) Category	Average Difference (I-J)	Significance
Willingness To Pay	Below 500000	Above 500000	0.439	0.037

Conclusion

This study investigates the factors influencing consumer intentions toward refurbished phones in Bangalore, focusing on attitude, subjective norm, perceived behavioral control, product knowledge, privacy concerns, and willingness to pay. The structural model shows good fit with acceptable indices (e.g., RMSEA = 0.068, CFI = 0.947, GFI = 0.909), confirming the model's validity and supporting all proposed hypotheses.

Key drivers of purchase intention include willingness to pay ($\beta = 0.182$, $p < 0.001$) and privacy concern ($\beta = 0.358$, $p < 0.001$), highlighting the need for transparent data practices and emphasis on cost-quality benefits. Other significant factors include attitude ($\beta = 0.118$), subjective norm ($\beta = 0.108$), perceived behavioral control ($\beta = 0.043$), and product knowledge ($\beta = 0.117$).

Sociodemographic analysis reveals:

- Age: Younger consumers (<30) show stronger purchase intentions, mainly influenced by social norms ($p = 0.048$).
- Education: Less-educated consumers report higher privacy concerns ($p = 0.031$).
- Income: Positively influences willingness to pay.
- Gender: No significant effect on purchase intention.

These insights suggest that targeted marketing—tailored by age, education, and income—is essential for increasing acceptance of refurbished phones. Emphasizing data security, affordability, and product reliability can further enhance consumer confidence and market adoption.

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