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Demographic Determinants of Product Knowledge and Purchase Attitude Towards Refurbished Electronics: A Mixed Research Approach

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Abstract

The refurbished electronics industry is providing sustainable solutions to the rising electronic waste in India by increasing the lifespan of electronics. Despite the numerous benefits associated with these green products, such as discounts, warranties, eco-certification etc., there exists a huge gap between the demand and supply of the products. The current study adopts a mixed method approach to develop insights into the awareness, perception & attitude of people concerning refurbished electronics through semi-structured interviews of 30 participants and analyses the influence of demographic factors such as age, gender, income, occupation etc. on product knowledge and the purchase attitude of the consumers towards refurbished electronics through a survey of 200 respondents. The data was analysed using SPSS and NVivo. The study revealed that gender wise difference is prevalent with respect to product knowledge. However, significant differences were found across different income groups and professions with respect to product knowledge. Qualitative study revealed that affordability and environmental benefits perceived by the customers are the major contributors for buying refurbished goods. The paper can help marketers in formulating and tailoring their business and marketing plans according to the demographic variables. Also, on a theoretical side the researchers can add to the knowledge of consumer behavior by exploring more comprehensive behavioral models based on mixed approach.

Keywords: Refurbished, sustainable, consumer behavior, mixed research, demographic.

1 Introduction

Millions of tons of electronic waste is generated through the discard of electrical and electronic devices throughout the world, posing a threat not only to human health but also to the natural flora and fauna. According to the estimates by a report of the United Nations in 2021, “each individual may generate up to 7.6 kg of electronic waste over his lifetime” (Murthy and Ramakrishna, 2022). “Electronic waste is among one of the fastest growing solid waste streams in the world, which is increasing 3 times faster than the world’s population” (Report by ILO, 2014). To mitigate the environmental and human threats of electronic waste, sustainable practices are the need of the hour. In this regard, there is an urgent need to manage the waste generated by electrical and electronic equipment. This challenge is to be addressed for the benefit of both the practitioners and the scientific community, thereby encouraging a more circular economy (Corsini et al., 2020; Bruno et al., 2021).

According to Desk, 2019, the challenge of reducing electronic waste can only be tackled through the use of refurbished electronics. The strategy of refurbishing is generally considered environmentally safe as it helps companies in saving energy and raw materials, it also helps in lowering the emissions of carbon dioxide, thereby positively leading to a more sustainable circular economy (Linton, 2008). According to Michaud et al. (2010), refurbished products can be put in the category of “green products” as refurbished Goods enhance the life of a product and “thus they are kept out of the waste system” such as landfills for the extended period, thereby saving the space that would be otherwise taken up by the products for landfills, also these goods reduce the air pollution that would have been generated by manufacturing the new products (Atasu et al., 2008).

Refurbishing is the “process of disassembling, cleaning, inspecting, repairing, replacing, and reassembling the components of a part or product to like-new condition” (Thorn and Rogerson 2002, 35). The refurbished product market will become more important in the future due to its growth and expansion. (Mitra 2007; Atasu et al., 2010; Guide and Li 2010; USITC 2012). Researchers have found that “refurbishing smartphones which are at the end of their life carries the most profitable processes and high environmental benefits” (Zink et al., 2014).

According to Transparency Market Research, this market is to grow at a compounded annual growth rate (CAGR) of 12.1 per cent from 2022 to 2031 from U.S \$85.42 to U.S \$ 272.91 globally. According to estimates by Statista, in the consumer goods category global refurbished consumer electronics was estimated to generate the highest revenue in 2022 at approx. 55.6 billion U.S. dollars which is forecasted to grow to around 120 billion dollars in 2026 globally. The above estimates highlight the opportunities available in this emerging industry. Manufacturing of a new smartphone accounts for almost 95% of a smartphone’s carbon footprint and a new smartphone generates an average of 85 kilograms of emissions in the first year of its use. Thus, one of the biggest elements that could reduce a smartphone’s emissions and carbon footprint is to extend the expected lifetime of the smartphone (Deloitte Belgium, 2022). According to Deloitte’s Digital Consumer Trends survey, “only 9% of the respondents bought were second-hand or refurbished phones”. The multi-country survey by Deloitte was done on digital services in 2022 on “38,150 respondents across 22 countries and five continents”, highlights that lack of trust on the reseller of refurbished Phones by 25 percent of the respondents plays a dominant role in the rejection for the market of refurbished products. The perception of inferiority of refurbished products by consumers reduces the attractiveness of the refurbished electronics. This negative perception is substantial in the case of consumers having lower socio-economic status (Zhang et. al. 2025).

Therefore the current paper aims to study the influence of various demographic factors such as age, income, gender, profession and level of education level on the purchase attitude and the product knowledge of the consumers by diving into the quantitative analysis and the qualitative analysis of the responses from the diverse demographic groups which can help the businesses to look out for the solutions which can further boost this astonishing industry which could help the circular economy in managing electronic waste more responsibly and sustainably. Prior extant literature in the field of social sciences indicates the demographic variables such as age, gender, income, occupation and education as control variables. However, in the current study demographic variables are taken as active determinants in indirectly influencing the purchase decision of the consumers through purchase attitude and product knowledge towards refurbished electronics to address the previous gap. This signifies the importance of demographic variables in the study. The theoretical contribution of the current study includes integration of demographic variable with the Theory of Planned Behavior (TPB) and Value- Belief-Norms theory by ,offering a more nuanced and in-depth understanding of the consumer behavior depicting consumer heterogeneity.

Research Questions:

RQ1 What is the awareness level of consumers towards refurbished electronics.

RQ2: What is the perception and attitude of people towards refurbished electronics?

RQ3: Does the product knowledge and purchase attitude towards refurbished electronics vary across the different demographic profiles?

To answer the above research questions which are very essential for the policymakers as well as for the marketers, the current paper aims to shed light on.

- i. To develop insights into the perception & attitude of people towards refurbished electronics.
- ii. To understand the level of awareness among the consumers and the various motivators that can affect the consumer’s intention to buy the refurbished electronics.
- iii. To know whether significant differences exist between genders concerning their product knowledge regarding refurbished electronics and their attitude towards these products.
- iv. To assess the existence of significant differences across various income groups of consumers relating to their knowledge and attitude regarding refurbished electronics.
- v. To assess the existence of significant differences across various age groups of consumers relating to their knowledge and attitude regarding refurbished electronics.
- vi. To know whether significant differences exist between various educational levels or qualifications of the consumers concerning their product knowledge regarding refurbished electronics and their attitude towards these products.

- vii. To know whether significant differences exist across various professions of the consumers concerning their product knowledge regarding refurbished electronics and their attitude towards these products.

2 Literature Review

Refurbished Electronics as the sustainable alternate to the new electronic gadgets have led to the growing research and managerial interest of this novel concept. In India it is still in the early stages as far as its demand and supply is concerned. Therefore, a stronger theoretical understanding of the behavior of the consumers is needed specially with reference to Indian consumers. To address the gap, demographic factors which play a dominant role in the purchase decisions of the consumers are included in the study. The variables of Theory of Planned Behavior and the Value-Belief-Norm Theory are studied to explain.

Socio demographic variables: In the study of Thakur and Gupta (2012), it was concluded that the various factors generated from internal and external sources such as “income, concern for environment etc. act as the major antecedents of green attitudes”. In the study conducted by Jain and Kaur (2006) on Indian consumers to examine the impact of socio-demographics on green buying behavior the results posit that “females showed a higher inclination towards green brands than males” whereas younger consumers groups were more willing to use green products and brands as compared to older consumer segments. Also, the higher income level and education level consumer groups were more likely to use environment/eco-friendly products than the other demographic groups. In the research by Kalantari et al. (2007) on Iranian consumers, it was found that factors like age, income, and education affected the environment-friendly behavior of Iranian consumers. Also, in the study conducted by Walia et. al (2020), it was found that demographic and social variables such as age, gender etc. significantly influence the consumption behavior of the consumers towards the green products. Meet et. al (2024) in their study conducted on Gen Z in India revealed that socio-demographic factors in the form of income, education and gender influence the green purchase intention of GEN Z towards the packaged drinks which are environmentally friendly in India.

Attitude: Irland (1993) defined “attitude as a mental and neural state of readiness” through which an individual’s response towards the situations with which they are confronted is affected. The previous research by Hini et al. 1995 and Hamzaoui-Essoussi et al. (2014) considers attitude as an important determinant for making purchase decisions. Srivastava and Mahendar (2018) concluded in their study that attitude of the customers has a significant positive impact on the intention of the consumers towards the purchase of the household solar products. Various other studies posit that attitude and the perceptions of the consumers can affect the consumer-driven outcomes regarding the green products purchase (Chan 2001; Hazen et al., 2012b). Price, retailer reputation and product quality acts as the major driver in shaping the attitude of the consumers for refurbished electronics (Barkhi et. al. 2024). ‘Attitudes often precede actions—meaning that enhancing consumer attitudes through sustained environmental education and engagement is essential before expecting shifts in behavior’ (Jain, R. (2024). Since “One’s perceptions of how others perceive a specific activity are reflected in their attitudes toward the subjective norms for that behaviour” (Singh et. Al., 2023) which indicates the attitude as major determinant for the behavior.

Product knowledge: Previous Researchers have found that age significantly impacts an individual’s Information Technology acceptance (Morris and Venkatesh, 2000). Also, it was the crucial determinant of technology acceptance and usage (McFarland, 2001). Since refurbished phones are generally available through online portals, their purchase and usage require a certain level of technology knowledge, therefore age may be an important factor influencing product knowledge. Therefore, the younger generation may have greater product knowledge due to social media exposure and time spent. Also, the Studies that depict the linkage between the genders found a significant relation between the two. The majority of the researchers found that “males tend to have more environmental knowledge about green issues than women” (Chandler (1972); Arcury et al. (1987); Schahn and Holzer (1990); Grunert and Kristensen (1992); Lyons and Breakwell (1994). In the study conducted by Mostafa (2009) on Egyptian consumers, Consumers’ knowledge about green products was one of the major determinants of green consumption.

The previous literature therefore adopted an isolated approach in TPB and VBN theory by not integrating the impact of demographic variables in relation to product knowledge and purchase attitude in context to developing economies like India. However, the lack of empirical studies having the sample of diverse demographics, particularly using the mix method approach gave the direction to the need of the current study.

3 Methodology

3.1 Research Design

The current study employs a comprehensive mixed approach using quantitative as well qualitative data to gain better insights into the awareness, perception, purchase attitude and product knowledge of the consumers towards refurbished electronic goods. The qualitative study was employed to study the complex behavior of the consumers which is often not displayed and analysed through a quantitative study thereby giving importance to the qualitative study to understand the factors affecting the decision making process.

3.2 Questionnaire Development

The questionnaire used for the current study, which is based on the variables purchase attitude and product knowledge has been adapted from Wang et. al. (2013). The earlier work of Wang et. al. (2013) was done on the remanufactured Chinese automobile spare parts industry which is adapted for refurbished electronics. The content validity of the questionnaire is tested on the basis of expert opinions. However, the statements of product knowledge and purchase attitude have been adapted from the previous literature having adequate reliability.

The questionnaire was divided into two parts. First part included the demographic data such as income category, gender, profession, age and education level, whereas second part consists of questions relating to two constructs i.e., product knowledge and purchase attitude. The constructs were measured on seven-point Likert scale ranging from strongly disagree to strongly agree.

3.3 Data Collection and Sampling Process

The current paper used a holistic mixed method approach using qualitative and quantitative data to develop insights into the awareness, perception & attitude of participants using qualitative data collected through semi-structured open-ended questionnaire and in-depth interviews through Google Forms. Specifically the qualitative study was done to gauge the unobserved and unexplained emotions and behavior of the consumers which cannot be mapped through quantitative data alone. Initially, a sample of 48 participants was reached using purposive sampling, of which 30 (response rate of 62.5%) agreed to participate in the study.

The minimum sample size that was required for the study was determined using G* Power. The required sample size using G* Power was determined as 107 after considering the medium effect size of 0.15, significance level of 0.05, two predictors and the statistical power of 0.95. Since the sample size used in the study was 200 which exceeded the minimum sample size calculated using G* power which ensures adequate sample size having good statistical power for hypothesis testing.

Further to study the influence of various demographic factors such as age, gender, income, and profession on product knowledge and purchase attitude towards refurbished electronics quantitative data was collected by means of an online survey of 200 respondents across different genders, ages, professions and income categories. A total of 315 respondents were reached, out of which 217 responded (68.8% response rate). After preliminary screening, 200 responses were analyzed using SPSS.

3.4 Hypotheses Generation

Based on the research objectives as discussed above the following hypotheses were drawn

H₀₁: No significant difference exists between males and females with respect to the product knowledge of refurbished electronics

H₀₂: No significant difference exists between males and females with respect to the purchase attitude of refurbished electronics.

H₀₃: No significant difference exists across various income levels with respect to product knowledge of refurbished electronics

H₀₄: No significant difference exists between the various income levels of the consumers with respect to the purchase attitude towards refurbished electronics.

H₀₅: No significant difference exists across different educational qualifications with respect to product knowledge of refurbished electronics.

H₀₆: No significant difference exists across different educational qualifications of consumers with respect to the purchase attitude towards refurbished electronics.

H₀₇: No significant difference exists across different professions with respect to product knowledge of refurbished electronics.

H₀₈: No significant difference exists across different professions of consumers with respect to the purchase attitude towards refurbished electronics.

H₀₉: No significant difference exists across different age groups with respect to product knowledge of refurbished electronics.

H₀₁₀: No significant difference exists across different age groups of consumers with respect to the purchase attitude towards refurbished electronics.

3.5 Questionnaire development

The questionnaire has been adapted from Wang et al., (2013). The instrument included two parts, first part included the basic demographic information about the respondents such as gender, income, occupation, age and education level. The next part covered the constructs of product knowledge (PK) and purchase attitude (PA) which were measured on a 7-point Likert scale.

4 Data Analysis

4.1 Qualitative Data Analysis

For qualitative data, thematic analysis is done by using the inductive approach on NVivo 14. The major themes and subthemes were generated from the responses which were categorized as **Product knowledge** as theme 1, **Purchase attitude** as theme 2, **Consumer challenges** as theme 3 and **Consumer motivation** as theme 4. Visualization techniques such as word cloud, etc., showing the frequency of the most used words were generated.

The code book developed is as follows:

Name	Description	References
1)Product knowledge	The knowledge about the product of the sellers	
Brands	It includes the brand or seller awareness dealing with refurbished electronics.	40
Information source	It includes the source of information of refurbished electronics such as internet, friends etc.	29
Performance	It includes the product knowledge with reference to the product features and its quality.	6
2)Attitude	It is the way that the consumer thinks about Refurbished Goods	
Negative attitude	It includes the negative connotation of the customers towards refurbished electronics such as recycled, Second hand etc.	11
Positive attitude	It includes the favorable evaluation of the goods such as eco-friendliness, affordability etc.	12
3) Consumer challenges	The challenges and the risks associated with Refurbished goods	
brand-related barrier	It includes the brand related barriers	2
product & performance	It includes the performance and product issues such as battery issues and low-quality issues.	32
Trust factor barrier	It includes trust factor relating to the reliability of the parts etc. as a barrier that restricts consumers to buy the products.	17
4) Consumer Motivations	The factors that may motivate you to buy	
Environment related	It refers to the environment related factors as the motivations to buy these products such as eco friendliness, sustainable products etc.	12
Performance-related	it includes quality and performance related features including warranty, certifications of the products which acts as the motivators.	4
Product related	It majorly includes the positive product features of the refurbished electronics such as affordability, reliability etc.	36

Table 1: Code Book of themes & sub-themes

The broad themes are hereby discussed:

Theme 1: Product Knowledge

Most of the respondents have a general idea about the term refurbished. The broad theme of product knowledge was further classified into sub-themes pertaining to *brand awareness*, *source of information* and *performance knowledge*.

One respondent (age: 18-24, student) says that

[...]means made to look new again by work such as painting, repairing, and cleaning.



Figure 1: Word Cloud of Product Knowledge

The majority of the participants had come across the term “Refurbished” from advertisements, online shopping stores, websites and social media. The respondents described the most common websites and stores where they saw the goods and showed familiarity with Amazon, Flipkart and Cashify, with maximum references of 22,14 and 14, respectively. Regarding the knowledge about the performance of refurbished goods, most of the respondents did not know the performance of the products.

[....] lack availability of the latest and trending features and overall durability of the product as essentially, they are repaired products subject to the fact whether repair will support the performance.

Word	Length	Count	Weighted Percentage (%)
Breach	6	2	0.97
Change	6	2	0.97
Claims	6	2	0.97
Defects	7	2	0.97
Fraud	5	2	0.97
Ownership	9	2	0.97
Originality	11	2	0.97
Problems	8	2	0.97
Products	8	2	0.97
Repairs	7	2	0.97
Genuine	7	3	1.46
Quality	7	3	1.46
Replacement	11	3	1.46
Smartphone	10	3	1.46
Trust	5	3	1.46
Defect	6	4	1.94
Parts	5	4	1.94
Screen	6	4	1.94
Performance	11	5	2.43
Product	7	5	2.43
Warranty	8	6	2.91
Battery	7	7	3.40
Original	8	7	3.40
Issues	6	9	4.37

Table 3: Word count for Consumer challenges

Another respondent added:

“The major pain points are service and performance related issues.”

One male respondent in the age group of 18–24 commented on the trust factor relating to the parts of the refurbished electronics as:

“The parts of the products may be duplicate”

Theme 4: Consumer motivation

The respondents saw affordability and environmental benefits of extending the life of the product (reduction in electronic waste) as the major motivators to buy refurbished electronics.



Figure 3: Word Cloud of Motivations

One respondent (age 25–30 having postgraduate degree) Says

[...] are budget-friendly and add to the extended life of electronic products hence, resulting in reducing electronic waste.

However, respondent says (2) that through eco-certification and testing, performance can be reassured.

One respondent of the age group 25–30 viewed the availability of refurbished goods as

“Their access to the lower income group of consumers as the majority of the consumers tend to reflect themselves as price sensitive.”

Word	Length	Count	Weighted Percentage (%)
Friendly	8	14	8.81
Budget	6	10	6.29
Price	5	9	5.66
Electronic	10	3	1.89
Environmental	13	3	1.89
Original	8	3	1.89
Pocket	6	3	1.89
Reliable	8	3	1.89
Waste	5	3	1.89
Affordable	10	2	1.26
Phone	5	2	1.26
Quality	7	2	1.26
Sustainability	14	2	1.26
Warranty	8	2	1.26
Accessed	8	1	0.63
Affects	7	1	0.63
Afford	6	1	0.63
Availability	12	1	0.63
Benefits	8	1	0.63
Branded	7	1	0.63
Causes	6	1	0.63
Checked	7	1	0.63
Choice	6	1	0.63
Condition	9	1	0.63

Table 4: Word count for Consumer motivations

Therefore, based on the above the following references

Codes	Aggregate number of coding references
Codes\\Attitude\\negative attitude	11
Codes\\Attitude\\positive attitude	12
Codes\\awareness	76
Codes\\awareness\\brands	40
Codes\\awareness\\Information source	29
Codes\\awareness\\Performance awareness	6
Codes\\Barriers\\brand related barrier	2
Codes\\Barriers\\product and performance-related barriers	32
Codes\\Barriers\\Trust factor barrier	17
Codes\\motivations\\environment related motivations	12
Codes\\motivations\\performance related motivations	4
Codes\\motivations\\product related factors	36

Table 5: Reference Codes

Theme	Sub-theme	Representative Responses
Attitude	Negative Attitude	“Personally, I don’t like buying refurbished smartphones as I’m always skeptical about how long they’ll last and whether any original parts have been replaced.” “I hate these phones. They always come with problems.”
	Positive Attitude	“My first impression of refurbished smartphones is positive. They provide an affordable, reliable, and eco-friendly alternative to new devices.” “My experience with refurbished electronics has been positive, offering good performance, significant savings, and reliable quality.”
Awareness	Brand Awareness	“I learned about refurbished smartphones through advertisements. There is a huge second-hand smartphone market, and organized platforms like Cashify have increased awareness.” “Yes, I’ve heard about refurbished smartphones. I came to know about them through Amazon and Cashify.”

Theme	Sub-theme	Representative Responses
	Performance Awareness	"I've used my friend's refurbished smartphone. It was in excellent condition with a great camera and good battery performance."
	Information Sources	"Yes, I have heard about refurbished smartphones through YouTube." "I came to know about them through advertisements and friends."
	Brand-related	"It was a great experience, but some companies commit fraud in the name of being genuine and trustworthy."
Consumer Challenges	Product & Performance-related	"My first impression of refurbished products is that they are not manufactured properly, have quality issues, and once a gadget develops problems, they continue to occur." "I was expecting sudden switch-offs or battery issues."
	Trust	"Expected life, minor performance issues, and fear of buying a second-hand product." "They are less reliable compared to new smartphones."
	Product	"It is good because it is pocket-friendly. Refurbished smartphones are a good choice for people who cannot afford new ones."
Consumer Motivations	Performance	"The main purpose of buying refurbished electronics is to obtain high-quality, reliable devices at a reduced cost while also being environmentally responsible." "If it is a secondary phone, refurbished phones are a good option, and I trust suppliers to have checked the device thoroughly."
	Environment	"My first impression of refurbished smartphones is positive; they provide an affordable, reliable, and eco-friendly alternative to new devices."

Table 6: Summary table of themes, sub-themes and responses of participants

4.2 Analysis and interpretation of Quantitative data

The quantitative data was analyzed using the IBM SPSS Statistics 22 and for ascertaining whether there exist any significant differences in the responses vis a vis respondents' demographics profile on the purchase attitude and product knowledge towards the refurbished electronics, non-parametric test using Kruskal Wallis test and Mann Whitney U test was employed. The sample of 200 was gathered across various demographics to evaluate the significant differences concerning product knowledge and purchase attitude. Out of a Sample of 200, 84 were males, and 116 were females.

Table 7, indicates that significant differences are found in the product knowledge of males and females ($p < 0.05$). Males are having more knowledge about the refurbished goods than the females as mean rank of males stands at 120.67 which is higher than the mean rank of females. Therefore, the null hypothesis is rejected. However, the study found no significant differences in the purchase attitude of females and males ($p > 0.05$). This may be due to the fact both the genders perceive refurbished goods as second-hand and there is a lack of trust for using the refurbished goods. Therefore, the study fails to reject the null hypothesis.

In Table 8, it was found that the respondents having a higher income of more than 1 Lac have more knowledge about refurbished goods followed by the income group of 25000-50,000 as the mean rank of the income group having income more than 1 lac is the highest among the other income groups which is 123.79. The study revealed that significant differences were found in the product knowledge of the respondents falling in different income brackets as the p-value found to be significant and less than 0.05 therefore, we reject the null hypothesis H_{03} . On the contrary, the differences were not found to be significant relating to the purchase attitude ($p > 0.05$).

Table 9, depicts that no significant differences in the purchase knowledge and attitude of the respondents having different educational qualifications were seen in the current study as $p > 0.05$ with respect to both variables. Therefore, the null hypotheses (H_{05} , H_{06}) are rejected.

Table 10, draws the inference that significant differences exist between the product knowledge of the respondents across the different professions ($p < 0.05$) and the people in the private job have more knowledge than the other professions (as mean rank is the highest among all i.e., 120.97). Whereas, no such significant differences were seen in the purchase attitude of the respondents with respect to different professions as the p-value is found to be non-significant which is greater than 0.05 and the chi square value is 4.096 at $df=4$. Therefore, H_{07} is rejected and we fail to reject H_{08} .

Table 11 depicts that significant differences were not found in the product knowledge of diverse age groups as the p-value comes out to be 0.196 which is greater than 0.05. Therefore, we fail to reject null hypothesis H_{09} . However, the purchase attitude among the different age groups was found significant as the value is less than 0.05. Thus, the null hypothesis H_{010} is rejected.

Variable	Gender	N	Mean Rank	Mann–Whitney U	p-value
Product Knowledge Avg	Male	84	120.67	3177.500	0.000
	Female	116	85.89		
	Total	200	–		
Purchase Attitude Avg	Male	84	96.52	4537.500	0.406
	Female	116	103.38		
	Total	200	–		

Table 7: Product Knowledge and Purchase Attitude Across Genders

Variable	Monthly Income	N	Mean Rank	χ^2 (df = 5)	p-value
Product Knowledge Avg	Below 10,000	84	86.76	12.837	0.025
	10,000–25,000	32	114.16		
	25,000–50,000	25	114.22		
	50,000–75,000	20	96.73		
	75,000–1,00,000	13	88.50		
	Above 1,00,000	26	123.79		
	Total	200	–		
Purchase Attitude Avg	Below 10,000	84	97.02	8.266	0.142
	10,000–25,000	32	106.45		
	25,000–50,000	25	115.16		
	50,000–75,000	20	107.73		
	75,000–1,00,000	13	117.38		
	Above 1,00,000	26	76.33		
	Total	200	–		

Table 8: Product Knowledge and purchase attitude across income groups

	Education degree	N	Mean Rank	Chi square (df=2)	P value
Product Knowledge Avg	Undergraduate	127	99.49	.107	0.948
	Postgraduate	59	102.28		
	Above PG	14	102.18		
	Total	200			
Purchase Attitude Avg	Undergraduate	127	102.82	3.021	0.221
	Postgraduate	59	91.31		
	Above PG	14	118.18		
	Total	200			

Table 9: Product Knowledge and purchase attitude across education level

	Profession	N	Mean Rank	Chi square (df=4)	P value
Product Knowledge Avg	Student	103	92.67	11.132	.025
	Private Job	60	120.97		
	Government Job	20	87.75		
	Self Employed	11	95.73		
	Other	6	81.58		
	Total	200			
Purchase Attitude Avg	Student	103	99.76	4.096	.393
	Private Job	60	97.41		
	Government Job	20	114.58		
	Self Employed	11	82.36		
	Other	6	130.50		
	Total	200			

Table 10: Product Knowledge and purchase attitude across profession

	Age	N	Mean Rank	Kruskal Wallis (df=4)	P value
Product Knowledge Avg	Between the ages of 18 and 24	124	97.27		
	Between the ages of 25 and 30	33	109.97	6.039	.196
	Between the ages of 31 and 40	37	109.93		
	Between the ages of 41 and 50	4	66.88		
	Above the age of 50	2	37.00		
	Total	200			
Purchase Attitude Avg	Between the ages of 18 and 24	124	98.88	11.322	
	Between the ages of 25 and 30	33	111.02		
	Between the ages of 31 and 40	37	108.27		.023
	Between the ages of 41 and 50	4	29.63		
	Above the age of 50	2	25.25		
	Total	200			

Table 11: Product Knowledge and purchase attitude across age group

5 Integration of Qualitative and Quantitative findings

The quantitative findings revealed that no significant differences were seen in the purchase attitude of the respondents across gender, income level, education and profession which is also supported by the qualitative study which sheds the insights on the attitude of respondents having diverse demographics where both male and female respondents expressed same attitude level towards refurbished electronics. Therefore, the study suggests that demographic factors such as gender, income, education and profession are not the strong determinants that affect the purchase attitude of the respondents towards the refurbished electronics. However, in context to age groups, significant differences were seen for the purchase attitude. The younger generation i.e., the age group of 25–30 showed the higher positive attitude in comparison to other age groups indicating the affordability and environment consciousness of the refurbished electronics. Therefore, age acts as the strong indicator that affects the attitude of the respondents. In context to product knowledge, quantitative study revealed the significant differences across gender, Income level and profession which is supported from the qualitative study where price sensitive respondents from different gender, income and profession have different product knowledge. With respect to product knowledge, education and age are not the strong predictors which is supported from the qualitative study indicating the shopping behaviour through usage and frequency of the gadgets.

6 Discussions and conclusion

The current quantitative study revealed that gender wise difference is prevalent with respect to product knowledge of refurbished electronics which are in line with the previous studies conducted by Chandler (1972); Arcury et al. (1987); Schahn and Holzer (1990); Grunert and Kristensen (1992); Lyons and Breakwell (1994). Although the purchase attitude was prevalent with respect to age group and specifically the age group of 25–30 shows the significant positive attitude for buying refurbished gadgets than other younger and older consumer groups. Therefore, the study is in the line with the earlier study conducted by Jain and Kaur (2006) which concluded that the younger generations or consumer groups shows more willingness to use green products than older consumer segments. Significant differences were found across different income groups and professions with respect to product knowledge. However, the qualitative study revealed that affordability and environmental benefits perceived by the customers are the major contributors for buying refurbished goods which aligns its findings with existing literature that emphasize the importance of affordability and environmental considerations by the younger consumers when purchasing refurbished products (Ho et al. 2003, Mishra et al. 2022). In the earlier studies attitude has emerged as a key factor which significantly affects the intentions of consumers to buy the refurbished goods (Agostini et al., 2021; Mahmud et al., 2024). However the qualitative study which is in the line of previous studies revealed that the consumers have the negative attitude towards the refurbished electronics which may be due to the lack of trust on the performance and quality of these products which affects their purchase intentions. In totality the financial attractiveness is the key factor that can affect the consumers' intention positively to buy the refurbished electronics (Wallner et al., 2024). Therefore, while the quantitative study highlights the significant differences in the product knowledge of the refurbished gadgets across various demographics such as gender, income and professions and purchase attitude among different age groups, the insights from the qualitative study revealed the concerns about the trust, reliability and negative attitude of customers. The consumers still perceive the refurbish electronics as cheap, second hand quality goods. However, few young respondents show their positive attitude and knowledge towards the refurbished

electronics due to their environmental impact and affordability. Therefore, the firms should align their marketing strategy with the objective of providing transparency, warranties, awareness campaigns, environmental benefits leading to the changes in the attitude of the different age groups and the product knowledge of the customers falling in the different income groups, professions and gender rather than just focusing on the affordability.

7 Implications

The current research holds both practical and theoretical implications. Practically, understanding the impact of demographic variables on the consumers' attitudes towards refurbished goods and their knowledge about refurbished electronics can help marketers tailor their marketing strategies based on different demographics such as age, occupation, income, gender etc. The firms can focus on awareness campaigns, strong advertising targeting the younger generation for bridging the knowledge gap among the generation Z regarding the usage, performance, availability of the refurbished electronics. The study can also provide insights to the businesses in enhancing their outreach and engagement activities with specific consumer groups and segments such as females which has lesser knowledge about refurbished goods. This can be done by using social media such as YouTube, Instagram extensively with the help of influencers explaining the refurbished electronics. The companies can target the customers in lower income segment by emphasizing more on affordability by providing EMI options. However, for the higher income group customers, the strategies can be deployed which focuses on sustainability and by providing premium refurbished electronics and after sales services. The above efforts will not only optimize the sales efforts, customer satisfaction and engagement towards building a more sustainable business but will also contribute in improving the product knowledge and reducing the myths and misconceptions of refurbished electronics.

The comprehensive research can broaden the scope of sustainability efforts by the policymakers as well the businesses who strive to build a more sustainable and environmentally conscious culture in their operations. Marketers should focus on aligning the environmental benefits associated with the refurbished electronics with the sustainability initiatives by the government for positively influencing the younger generation such as GEN Z etc. which is more environment conscious. The resellers of the refurbished electronics can use the research in making strategic decisions regarding the packaging, and building trust in the refurbished products by providing transparency relating to the product features and performance which can be done by providing information relating to battery health, history of the product such as age of the product, and grading according to the condition of the product. . It was imperative from the study that the respondents show a lack of trust in the performance features of the refurbished and they carry a negative attitude towards the goods in the form of old, reused, second hand etc. Therefore, the firms can enhance trust among various segments by offering product warranties, certifications and return policies or money back schemes etc. Such strategies can help the firms in significantly improving the purchase attitude of the customers.

On a theoretical side, the findings of the study contribute to the broader theoretical understanding of consumer behavior through the study of variables attitudes and product knowledge in the context of refurbished electronics. The findings of the research shed light on the complex interplay between attitudes, demographic factors and product knowledge adding knowledge to the enriching existing theories in consumer behavior. It may also pave the way for developing new theoretical frameworks that can better depict the complex consumer decision-making process. The study highlights the significant impact of attitude and product knowledge of the customers towards the refurbished electronics that supports the earlier theories such as Theory of Planned Behavior (TPB) which confirms that positive attitude, product knowledge and perception of the customers drive the purchase intention leading to a positive purchase behavior of the consumers. However, the current study holistically integrates TPB and VBN to develop the comprehensive framework by taking into account the active role of demographic factors rather than its role as control variables.

8 Limitations and future research directions

The study revealed that demographic factors play a crucial role as the determinants of the purchase attitude and product knowledge which can be utilized by the marketers to exploit this market for refurbished electronics which is still in nascent stage in developing nations like India. The market can be targeted on the basis of different segments such as age, gender, occupation etc. which according to the study shows significant differences in the product knowledge and purchase attitude across different demographic segments. However, the current research has some limitations. Future researchers are advised to add value by analyzing the data on a greater sample size across different geographical locations depicting the more comprehensive expression of the consumers' attitudes and knowledge about the products. In addition, the studies can be conducted by analyzing the data collected from the reviews of consumers from online forums, websites and social media platforms which sell refurbished electronics which can provide a better basis for showing the consumers' actual sentiments, discussions and purchase behavior as a whole. Furthermore, the research uses the non-parametric test to evaluate the significance level between two or more independent samples which limits the scope of the quantitative research. Random sampling techniques could be used utilizing a comprehensive sample size for better results. The paper analyzed the impact of a few demographic variables only such as age, gender, occupation, education and income level which can be broadened by taking into consideration the other socio-demographic variables such as religion, location, social class etc. For a better understanding of complex consumer behavior, longitudinal studies can be conducted by the future researchers to analyses the changes in the attitudes and knowledge about the refurbished electronics over a period of time thereby providing a

broader insight into changing consumer trend of attitude and knowledge.

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