A Study on Housewives' Intention towards Reuse, Repair and Recycling of Electronic Products in Udaipur

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Abstract

In the past few years, the global market of Electrical and Electronic Equipment has grown exponentially and this has led to a constant increase in e-waste which is not only hazardous for the environment but also for human health. Hence, it is essential to reuse, repair, and recycle electronic products for a better and healthy life. The purpose of this paper is to discuss the factors that influence the intentions of the housewives as well as actual buying behavior towards reuse, repair, and recycling of electronic products. The study uses exploratory and descriptive research design to get a detailed insight into the topic. A detailed review of literature is done and a survey is carried out by interviewing housewives and their responses were recorded. The research paper concludes that storage facility and subjective norms have a significant impact on molding the intensions of housewives towards reuse, repair, and recycling of electronic products. The study has a lot of future scope as it includes various dimensions which are yet to be discovered and the major limitation of the study is the limited research area.

Keywords: Electronic, Reuse, Recycle, Repair, Housewives.

Introduction

The electronic industry is one of the largest and innovative industries in the entire world. Waste electrical and electronic equipment are considered as a major threat to the whole world. Every year numerous electronic items are sold and after their usage, they become a complex waste matter. Few products are dumped; while the others are burnt or exported to recyclers. Thus, the uncertainty of the use of e-waste is 75% or ways are found to use them such as refurbishment, re-manufacture, reuse and repair. It is a growing global problem because it contaminates soil,as well as water, and people living in the areas nearer to e-waste disposal sites, are more prone to get affected by the disposal of e-waste.

According toThe Global E-Waste Monitor 2020, e-waste worth 53.6 million tonnes was generated by consumers globally in 2019, up by 20% in 5 years and out of which only 17.4% was sustainably recycled.Recycling e-waste is important as metals and plastics can be extracted from them which in turn can be used for manufacturing more electronic products. Around 95% of e-waste goes tounauthorized e-waste collectors such as kabadiwala (scrap dealer); which is one of the

worst ways to discard e-waste. Reuse of electronic products is also very essential for reducing e-waste such as the use of second-hand goods should be promoted for increasing the durability of products. While efforts should be made for getting the products repaired despite purchasing new electronics. India is the only country that has legislation on e-waste in Southern Asia such asHazardous Waste Management (HWM) Rules covered e-waste beforeE-Waste (Management) Rules, 2016.

Review of Literature

Islam, Dias & Huda (2021) undertook a case study of university students to understand awareness of e-waste, consumption, disposal and recycling behaviour of young consumers. Findings of the study demonstrated that consumers are very well aware about e-waste as well as its harmful impacts and purchased laptops and television more than any other electronic products as well as it was found that maximum number of consumers disposed electronic products because they were damaged or were functioning improperly.

According to (Jabeen, Ahmad & Zhang, 2021) perceived critical factors affect the intensions of the consumers towards purchase of renewable generation technologies (RGTs). The study highlighted commitment about environment protection, perceived outcomes of using RGTs, knowledge about RGTs as the major reason which shape the actual behaviour and perceived influence of friends and colleagues as a subjective norm which influence the intensions and reflect the actual behaviour. While perception of self and control factors such as age, sex, family income and qualification directly reflected actual behaviour.

Nowakowski, Szwarc&Boryczka (2020) studied about sustainable e-waste collection through combining a novel vehicle and an artificial intelligence algorithm. The process for sustainable e-waste collection starts with sending request for pickup of e-waste using communication channels such as cell phones, and mobile apps and then registering in the server of waste-collection companies. After collection, optimization of e-waste collection vehicle routes through artificial intelligence algorithm which is followed by the last step of the process that is maximising collected waste equipment's through a novel vehicle.

Thi Thu Nguyen, Hung, Lee &Thi Thu Nguyen (2019) studied about the determinants which influenced behavioural intensions of recycling of e-waste. The major determinants as highlighted in the article were attitude such as awareness as well as attitude towards recycling, past recycling experiences, subjective norms such as laws, regulation and social pressure and perceived behavioural control such as cost and inconvenience. Findings of the study demonstrated that laws and regulations was the most influential towards behavioural intensions of recycling of e-waste irrespective of gender.

Al Mamun, Mohamad, Yaacob & Mohiuddin (2018) studied intensions and behaviours of low-income households towards green consumption. The study highlighted eco-literacy, subjective norms, intensions, perceived behavioural control and self-efficacy as the major factors affecting behaviour towards green products. Findings of the study demonstrated that perceived behavioural control and attitude had a positive effect on consumption of green products and recommended implementation of policies and programs to reduce the harmful impact on environment by adopting green consumption.

Bekaroo, Sungkur, Ramsamy, Okolo &Moedeen (2018) studied about augmented reality as an emerging technology which played a huge role in fostering engagement, providing unique learning experiences and improving understanding. The study highlighted that augmented reality helped in increasing awareness along with learning about energy consumption by electronic devices such as projectors, printers, computers, microwave, oven, coffee maker, CD player, kettle, TV, washing machine, induction, battery charger, vacuum cleaner, lighting, hair dryer, refrigerator, air conditioner, fan and dishwasher.

Dabija, Bejan& Grant (2018) studied about green behaviour, green loyalty, proclivity for environmental protection and responsible consumption. Findings of the study demonstrated that electronic devices at stores, workplaces or at home contribute a lot towards environmental pollution if they are not collected and discarded properly. It was found that buy-back programs initiated by various electronic retailers as their social responsibilities played a huge role in attracting the consumers towards their stores and this in turn influenced the future preferences of electronic stores to adopt sustainable practices.

Kumar &Kausha (2017) examined factors which affected attitude and intension of the consumers towards purchase of electronic durable goods. The study highlighted demographic factors which influenced the intensions and attitude of consumerswere age, gender, income, education, occupation and marriage status. The study concluded that the most significant factors which influenced the purchase of electronic durable goods were perceived price, perceived quality, perceived brand image and perceived risk.

Lepawsky, Araujo, Davis &Kahhat (2017) studied about

the e-waste problem and recommended Best-of-Two-Worlds as a single solution to overcome this problem. The study highlighted that ethical electronic repair, reuse, repurposing and recycling (EER4) of discarded electronic can be manged through diverse range of economic possibilities such as profit organisation and emphasized that sufficient wages, safety of workers and mitigation of resource use as those practices where Bo2W and EER4 overlap. The study recommended that electronic product should be recycled only when repair, repurposing and reuse are completely explored.

Marques & da Silva (2017) studied about management of e-waste in Portugal. The study highlighted hazardous components of e-waste such as Arsenic, Lead, Barium, Cadmium, Beryllium, Chromium, Mercury, Nickle and Selenium which can even lead to serious health diseases and recommended that more recollection points, increased re-use of equipment's, changes in the productions of equipment's such as producing equipment's through use of sustainable material and spreading awareness through information and campaigns for minimising e-waste will help in reducing e-waste.

Bangs, Meskers, Van Kerckhoven& Refining (2016) studied about the trends in electronic products like decrease in the unit weight of the products, reduced size of devices such as tablets, smartwatches, smartphones and the convergence of devices. The study even threw light on limitations of recycling electronics such as all elements could not be recovered from a complex material, inability to recover 100% of an element even by using advanced recycling system, necessity of economies of scale to use advanced recycling processes and high volatility in commodity prices.

Singh (2016) discussed the scenario of Indian cities regarding management of e-waste and public health because substances present in e-waste are harmful for environment as well as human health and identified strategies which could be used for management of e-waste. Strategies identified included life cycle assessment, multi-criteria analysis, material flow analysis, extended producer responsibility, preparation of collection system, legislation, logistics, and manpower along with strict regulations on better management for improved working environment.

Oteng-Ababio&Amankwaa (2014) studied about current e-waste management practices in Ghana. The study threw light on various initiatives and international laws formulated for management of e-waste such as Extended Producer Responsibility(EPR) adopted by European Union, 'Consumer Pay model' was adopted in Japan, 'Mixed Model' employed by USA, “Regulation on the Administration of the Recovery and Disposal of WEE” promulgated by China; and in the African region, acts like The National Waste Act and Consumer Protection Act were established for management of e-waste.

Panda (2013)studied about management of e-waste and green computing. The article defined green computing as use of computing resources in an efficient manner and waste management as treating any substance which had been discarded in an environmentally-friendly manner. Findings of the study demonstrated that green computing led to reduced power consumption and pollution control and the main problem witnessed during management of e-waste was burning of e-waste in spite of burying and dumping.

King, Burgess, Ijomah, & McMahon (2006) studied about repair, recondition, remanufacture and recycle as the strategies for reducing waste. The study defined repairing as an approach towards correction of specified faults in a product and reconditioning as an effort to rebuild a product to improve its working condition. While remanufacturing as a process where manufacturer buy back the used product for remanufacture of products to improve its quality and recycling as a process of collection and processing of discarded material and concluded that recycling strategy of reducing waste requires most corrective energy.

Objectives

·To study the actual behavior regarding buying, reselling, repair, reuse and recycling.

·To understand the factors influencing the housewife's intensions.

·To study the effect of demographic factors of housewives on 3'Rs

Research Methodology

The research methodology includes the following points:

Data Source: Primary data were used for conducting the survey of respondents. The questions asked includes the data of demographical variables, close ended scale items with 5-point Likert scale (Strongly disagree to strongly agree). Secondary data was also used which includes extensive literature review, scholarly publications, book, journals and other syndicated data from the institutions and other relevant sources.

Universe of study: The current study includes total number of housewives using electronic gadgets in Udaipur.

Sampling plan: Respondents were selected to investigate their intentions towards reuse, repair and recycling of

electronic products. Hence, the research population comprised of housewives of Udaipur in Rajasthan.

Sample size: For the purpose of current study 300 housewives were selected.

Sampling method: convenience sampling method was used for choosing the housewives for collection of samples.

Data Analysis Tools: The data were examined by using and one sample 't' test via statistical software known as SPSS-ver19. However, all of the questionnaires were first meticulously examined in terms of correctness and completeness.

Table-1: Demographics

Dimension	Category	Percentage
Age	<25	10%
	25-40	52%
	41-55	30%
	>55	8%
Education	School Education	7%
	Under Graduate	23%
	Post Graduate	61%
	Doctorate	9%
House hold Income	<2 LPA	20%
	2-5 LPA	37%
	5-8 LPA	30%
	>8 LPA	13%
House hold Size	2-4 members	59%
	5-8 members	31%
	>8 members	10%

Majority of respondent are from 25-40 years of age. 30 percent of customers are between 41-55 years of age as this is the age of increase responsibility to family and only 10 percent of female customers are more than 50 years of age. Majority of women respondents are post graduate (61 percent of customers) and 9 percent of customers are doctorate of Philosophy. The income level wise analysis revealed that out of the total customers, majority of customers (37 percent) are earning 2-5 LPA and 30 percent of customers are having house hold income between 5-8 LPA and only 20 percent of respondent belong to income group of less than 2LPA. Table-1 result showed that 59 percent of surveyed female respondent live in nuclear family structure of having 2-4 members. 31 percent of respondents agreed to have a family size of 5-8 members and only 10% of customers live in large joint family structure of family size of >8 members.

Data Analysis and Findings

The following hypothesis has been formulated for measuring housewives' attitude towards reuse, repair and recycling of electronic products.

H1: Factors constituting sustainable strategies has significant influence on housewives' attitude towards reuse, repair and recycle.

Table-2 presents 3R dimensions and customer attitude has been measured using Likert scale (1=Never to 5= Most Frequently). Following scale items are used to measure consumer opinion towards reuse, repair and recycling strategies.

Table-2: 3R dimensions

3R Dimensions	Variable	Mean	Std. Deviation
I buy new electronic gadgets even if the older ones are still working	3R1	3.680	1.122
I get my gadgets repaired in spite of purchasing new ones	3R2	2.040	1.113
I buy second-hand and/or "re-assembled" gadgets	3R3	2.300	0.855
I prefer to get my products recycled rather than disposing them in environmentally un-friendly manner	3R4	4.120	1.178
I reuse my electronic products	3R5	2.260	1.181
Storage facility	InF1	4.331	1.221
Presence of collectors of e-waste	InF2	3.890	0.898
Subjective norms/social pressure	InF3	4.342	1.321

From the descriptive statistics, it can be confirmed that respondents shown a positive attitude towards Product recycling. To further test result from descriptive analysis, we applied one sample 't' test. The one-sample t-test is used to determine whether a sample comes from a population with a specific mean. For the present analysis, researcher test the data with hypotheses mean of 3. This equates to declaring statistical significance at the p< .05 level.

Table-3: One Sample 't' test

One-Sample Test						
	Test Value = 3					
	t	Df	Sig. (2 - tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Prd1	13.545	299	.000	.68000	.5814	.7786
Prd2	-20.876	299	.000	1.04000	.9421	1.1379
Prd3	-33.989	299	.000	1.30000	1.2249	1.3751
Prd4	21.254	299	.000	1.12000	1.0165	1.2235
Prd5	-23.853	299	.000	1.26000	1.1562	1.3638
InF1	13.489	299	.000	1.50000	1.1149	1.2651
InF2	17.254	299	.000	1.62000	1.1235	1.1235
InF3	23.453	299	.000	1.36000	1.1125	1.3648

The p values of majority of dimensions are <0.05, therefore, it can be concluded from the mean value analysis, that women customers buy new electronic gadgets even if the older ones are still working, occasionally get gadgets repaired in spite of purchasing new ones and less likely to prefer to buy second-hand and/or "re-assembled" gadgets. Housewives also willing to get products recycled rather than disposing them in environmentally un-friendly manner and occasionally reuse electronic products.Further respondents give importance to Storage facility, Presence of collectors of e-waste and social pressure for promoting sustainable behavior towards electronic goods.

The following hypothesis is also developed to test the assumption of the impact of customer demography on intention.

H2: There is no relationship between demographic factors on sustainable behavior.

To identify that the variation in respondent's perception across demographic categories; ANOVA analysis was used with SPSS-19 software. The ANOVA provides a statistical test of whether or not the means of several groups are all equal. The results on ANOVA were provided in table-4.

Table-4: Demographics and ANOVA result

Dimensions	Mean	Sum of Squares	df	Mean Square	F	Sig.
Age		2.88	3	.96	4.69	.00
<25	3.94					
25-40	3.80					
41-55	3.33					
>55	3.66					
Education						
School Education	3.88	2.63	1	2.63	12.88	.00
Under Graduate	3.73					
Post Graduate	3.12					
Doctorate	3.44					
Income						
<2 LPA	3.15	2.90	2	1.45	7.10	.00
2-5 LPA	3.45					
5-8 LPA	3.83					
>8 LPA	3.92					

The result of ANOVA test provided as F Ratio with p value, which revealed statistically significant differences across groups. Perception regarding 3R strategies differs across age, education, and income groups. From the mean analysis, it can be concluded that women of age group of 20-40, graduate having annual income more than 2 Lakh have higher positive intention regarding reuse, repair, and recycling strategies.

Conclusion

The results show positive responses of housewives towards recycling electronic products. They prefer to get their products recycled rather than disposing of them in an environmentally unfriendly manner. On the other hand, the attitude of housewives towards the purchase of second-hand products and the repair of electronic products shows negative responses as they prefer to get their gadgets replaced despite making an effort to get them repaired. The findings of the study demonstrate that re-usability of electronic products is also not preferred by housewives. Moreover, they purchase new items even when the old gadgets are still working. Major factors that influence the behavior of housewives are storage facility, subjective norms, and the presence of collectors of e-waste. The results indicate that demographic variables such as age, household income, education, and household size also play a huge role in molding the behavior of housewives towards sustainable consumption.

Suggestions

This study suggests the use of second-hand or re-assembled products should be promoted to reduce e-waste. Efforts

should be made to create awareness regarding 3Rs of electronic products by launching various campaigns or through adopting initiatives. In addition, housewives should be informed about the harmful impacts of e-waste so that they can change their disposal behavior. They can be informed through social advertising on television or social media.Efforts should be made to educate housewives not to discard e-waste to unauthorized dealers such as kabadiwala (scrap dealer) as they lack the necessary skills to recycle electronic gadgets and end up causing damage to the environment. Moreover, new laws and regulations should be formulated to prevent unsustainable behavior and strict actions must be taken against those who break the laws and rewards should be given to those whose behavior reflects sustainability.

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