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## Article

# Integration of Circular Economy Principles in Consumer Behaviour for Electrical and Electronic Equipment

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## INTEGRATION OF CIRCULAR ECONOMY PRINCIPLES IN CONSUMER BEHAVIOUR FOR ELECTRICAL AND ELECTRONIC EQUIPMENT

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### Abstract

The electrical and electronic equipment market (EEE) is a growing one due to technological developments and innovation. The present paper captures the consumer behaviour regarding the purchase, use, and disposal of these types of equipment in the light of the transition to a circular economy. To illustrate consumer perception and attitudes towards EEE products, we conducted quantitative marketing research on a sample of 1005 urban respondents, representative by gender, age, and size of locality of residence. The research results show a rather rational consumer profile in relation to EEE products, but depending on the category of equipment, their involvement in repair, recycling, or reuse actions is different. There is also a relatively low willingness of Romanian consumers to access second-hand EEE products.

The article proves its utility by proposing a set of measures to improve the circularity of EEE products, in which both EEE producers and consumers actively participate.

**Keywords:** Circular economy, marketing research, consumer behaviour, electrical and electronic equipment, repair, reuse, disposal.

**JEL classification:** M30, Q56

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## **Introduction**

The growth in sales of electrical and electronic equipment (EEE) has been rapid in recent years. Consumers have begun to replace these products at ever shorter intervals, often not depending on their condition but due to technological wear or obsolescence (McCollough, 2009). Growth in consumption is increasingly linked to accelerated technological progress, which has enabled innovation cycles to be shortened and EEE with advanced functionality to be launched at prices that are more and more affordable for a wide range of consumers. According to statistics (Reportlinker, 2022), the global EEE market will grow from \$3,192.85 billion in 2021 to \$3,521.21 billion in 2022, at a compound annual growth rate (CAGR) of 10.3%. In Romania, EEE sales have been on an upward trend during the pandemic period and one of the drivers has been the increase in telework among employees (GFK, 2022).

Fierce competition and continuous diversification of supply have transformed EEE into essential products in consumers' everyday lives. Producers play an important role in stimulating EEE consumption, and business development objectives are not always easy to synchronise with the European Union's objectives of stimulating product reuse to ensure sustainable consumption (European Commission, 2015). To ensure the affordability of EEE and increase its uptake, since the 1980s, the characteristics and capabilities of EEE have evolved using cheaper materials but manufactured to higher technological standards (Kang and Schoenung, 2005). At the same time, although EEE manufacturers have been able to adapt to consumer demands for novelty, availability, and ease of purchase in relation to market requirements, the development of supply also has several adverse consequences. In economic terms, the close competition between suppliers and the increase in the number of innovations have led to a shortening of the life cycle of EEE, with some products becoming morally obsolete shortly after being launched on the market (Wilkinson and Williams, 2020). The increasing replacement of equipment by consumers in the absence of environmentally responsible behaviour has allowed EEE to become a major source of waste (The European Parliament and The Council of The European Union, 2012).

Recently, the waste stream from electrical and electronic equipment (WEEE) was considered to have the most accelerated evolution globally (Baldé, Wang and Kuehr, 2016), with 40-50 million tonnes produced annually and an annual growth rate of 4-5% (Golev et al., 2016). At the same time, at the EU level, statistics show that of the 12 million tonnes of WEEE disposed of annually, only about 30% is properly collected and recycled (Williams, 2016). In the case of Romania, in 2019, 223 kilotons of electronic waste were generated, which is an average of 4 kilograms per capita (Forti et al., 2020). When these values are analysed, which confirm the existence of significant quantities of EEE waste, justified concerns arise with regard to the impact on environmental pollution and the consumption of natural resources. In this context, the limitations of the traditional linear economy in ensuring future resource security are becoming increasingly apparent. Solutions for the proper management of WEEE are currently offered by the principles of the circular economy, since a large proportion of end-of-life EEE ends up in household landfills without allowing for the recovery of component materials or is disposed of by consumers inappropriately in the household waste stream (WRAP Cymru, 2018).

Consequently, consumers are important stakeholders in the management of WEEE, and their behavior can either foster or hinder the implementation of circular economy principles. Consumers' decisions and actions have a significant influence on the lifetime of products,

and behaviors tend to differ with respect to variables such as purchase of new or second-hand EEE, willingness to repair defective products, receptiveness to industry-wide novelties, and end-of-life disposal of products before the end of their service life (Pérez-Belis et al., 2017).

The aim of this paper is to capture the role of the consumer in the transition to a circular economy in electrical and electronic equipment through the lens of how consumer behaviour influences product longevity. This was achieved by conducting a marketing research survey to understand consumer behaviour regarding the purchase, use, and disposal of electrical and electronic equipment. The paper is structured in three sections: the first part reviews the literature on EEE consumer behaviour from a circular economy perspective, then presents the quantitative research methodology carried out among Romanian EEE consumers and the main results obtained, and the third part highlights a series of conclusions and managerial implications for improving the transition to the circular economy.

## **1. Review of the literature**

The circular economy is a system that focuses on the preservation of value throughout the product's lifetime. The concept includes all the stages that a product goes through, from a design based on value preservation, to the use stage where losses are minimised, to the end-of-life stage where the resulting waste is a useful resource for future production (Geissdoerfer et al., 2017). The circular economy is a viable alternative to the traditional economy, aiming to make optimal use of resources and prevent waste, maximising value in the production and use process. At the same time, through processes of reuse, repair, refurbishment, recovery, or recycling, we can ensure an extension of the life cycle of products in a sustainable manner (Rogers, Deutz and Ramos, 2021).

All these processes are also reflected in the European Union's Action Plan for the Circular Economy, which focuses on waste reduction and reuse and also underlines the importance of product repair in achieving sustainability and resource security (European Commission, 2015). In other words, circular economy strategies aim to ensure the longevity of products, both by using sustainable materials in the design and production process and through the promotion of repair, reuse, and recycling opportunities for responsible consumer use. Consumer behaviour is a key determinant in the adoption of circular economy principles at the societal, community level, as the reduction of waste disposal and the recovery of valuable secondary raw materials depend on the consumption patterns of individuals (The European Parliament and The Council of the European Union, 2012).

The study of consumer behaviour in relation to the circular economy is present in the literature, both in the analysis of factors that stimulate or hinder the adoption of such behaviour (Testa, Iovino and Iraldo, 2020; Hina et al., 2022), as well as by exemplifying certain particularities of some countries or regions (Korsunova, Horn and Vainio, 2021; Patwa et al., 2021). Research into EEE consumer behaviour and the circular economy is closely related to the prospect of operationalising circular economy strategies that involve efforts by consumers to adjust their EEE purchase and use patterns, as well as to recycle or separately collect waste once these products are taken out of use. In this regard, it should be noted that in some situations, consumers tend to replace EEE more and more quickly, driven by fashion and technological trends in the industry, resulting in a significant number of end-of-life EEE being stored at home but often in good working condition (Babbitt et al., 2009).

In addition to inconvenience for consumers, stored and unused products do not allow their recovery through recycling or reuse by others, a situation that is particularly common for small equipment (Polák and Drápalová, 2012; Pérez-Belis et al., 2017).

At the same time, many recycled EEEs are products with minor defects that can be easily remedied or are products still in working condition (Pérez-Belis et al., 2017). This information confirms the influence of industry innovations on consumers' decisions to purchase new electrical equipment and the premature replacement of much equipment. In order to achieve a high recycling rate of EEE and to ensure the success of waste collection, consumers need to be informed about the obligation not to dispose of WEEE as unsorted municipal waste and to carry out separate collection of WEEE, as well as about the collection schemes (e.g., public collection facilities set up in specialised shops) and their role in the management of WEEE (European Parliament and Council of the European Union, 2012).

Another important variable of consumer behaviour regarding the circular economy is their willingness to repair products with malfunctions. The ability to repair goods is essential to extend the life of products (Stahel, 2016) and delay their disposal. However, many consumers lack confidence in their own ability to repair products because they do not have the necessary experience and knowledge (Cole and Gnanapragasam, 2017). In the case of EEE with simple repair mechanisms, which can be carried out by consumers without specific expertise, the replacement of products is postponed for some time (Van Nes and Cramer, 2005).

The feasibility of repairs is often influenced by factors beyond the consumer's control, and the main difficulties include the high cost of professional services and limited access to spare parts (King et al., 2006; Diddi and Yan, 2019; Türkeli et al., 2019). Other barriers to consumers' decision to access EEE repair services are insufficient information on specialised services, easy access to new products, lack of confidence in the quality of repair services, and scepticism about the outcome of the repair consisting of the perception that the repaired equipment will only work for a short period of time (Guiltinan, 2009; Bovea, Pérez-Belis and Quemades-Beltrán, 2017). Consumers' intention to repair faulty equipment is largely dependent on the type of products. Thus, product repair is more likely for large equipment than for small equipment, the latter often being taken out of service once problems occur in use (Hennies and Stamminger, 2016).

Consumer attitudes towards second-hand EEE are rather unfavourable, the reasons being related to the association with poor quality products, concerns about avoiding aspects of poor hygiene, or being perceived in a socially undesirable way (Fisher et al., 2008; Fortuna and Diyamandoglu, 2017). Consumer behaviour in extending the life of EEE by reusing products is more likely to take the form of donating equipment that is in working condition (Lyndhurst, 2011), as well as reselling them on online platforms (Cole and Gnanapragasam, 2017). Buying second-hand EEE products, although part of product reuse initiatives, is less common (Pérez-Belis et al., 2017).

The review of the literature shows that, despite the existence of a formal regulatory framework for the circular economy and strong EEE waste management policies at the EU level, consumer participation in circular economy activities is at an early stage and that the factors influencing behavioural patterns are multiple, both external, industry related, and internal, specific to the consumer profile. The novelty of the article lies in developing an understanding of consumer behaviour towards circular economy practices in the current

economic and social context. At the same time, the research carried out presents an overview of all categories of EEE in relation to consumer behaviour.

## 2. Research methodology

To address the complex issue of the consumer's relationship with the circular economy, we conducted quantitative research. Data were collected based on a questionnaire consisting of two parts; the first part of the questionnaire focused on highlighting consumer behaviour towards EEE products consisting of 12 questions, and the second section was dedicated to demographic data. The questionnaire included a filter question related to the respondent's place of residence, with only urban respondents being accepted in the study. The sample consisted of 1005 urban respondents, representative by sex, age, and size of the place of residence. The sampling error was  $\pm 3.07$  at the 95% confidence level. Data collection was conducted online using the ISense Solutions panel and data was collected from 2-6 September 2022. The sample structure is shown in Table 1.

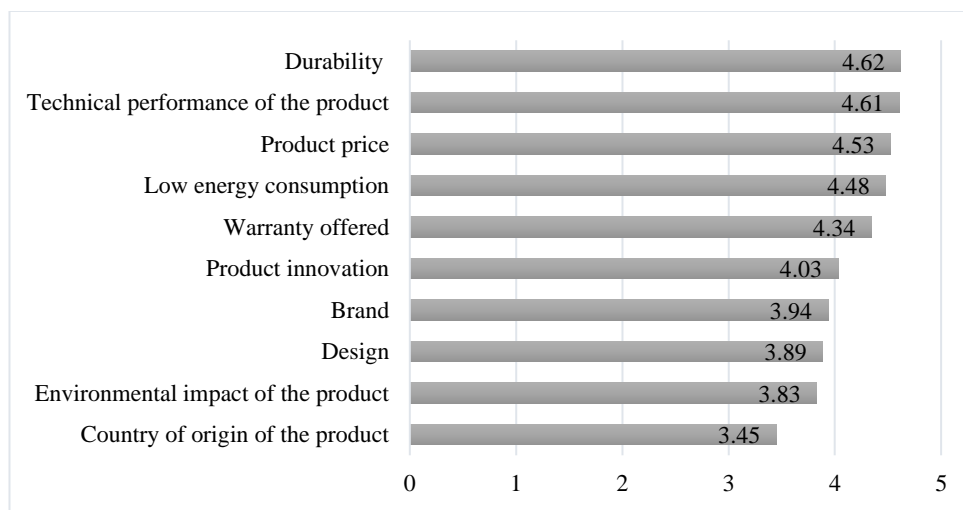
**Table no. 1. Sample structure**

		No. of respondents	% of the sample
<b>Gender</b>	Men	482	48.00%
	Women	523	52.00%
<b>Age</b>	18-29 years	191	19.00%
	30-45 years	382	38.01%
	46-65 years	432	42.99%
<b>Size of the location</b>	Bucharest	179	17.81%
	>200k	304	30.25%
	50-200k	262	26.07%
	<50K	259	25.77%
<b>Household size</b>	1 person	135	13.40%
	2 persons	283	28.16%
	3 persons	297	29.56%
	4 persons	215	21.39%
	5 or more people	75	7.48%

The main aspects of the research concerned: consumer behaviour in the purchase of EEE, in terms of the number of products purchased and the criteria influencing purchasing decisions; specific actions of circular economy taken by consumers in the field of EEE; consumer behaviour with regard to EEE replacement - situations in which EEE replacement takes place, destinations given to unused products, and reasons for premature product replacement; importance attached by consumers to product repair; disposal behaviour of non-functioning EEE products; consumer reasons for not repairing defective products; frequency of purchase of second-hand EEE products, reasons for buying and not buying second-hand EEE. Data analysis was performed in IBM SPSS Statistics (version 25).

### 3. Research results

The first objective of the research was to identify consumer behaviour when purchasing EEE, in terms of the number of products purchased and the criteria influencing the purchase decision. The results show a very high consumption of EEE, with 58% of the respondents stating that they have bought between 1 and 3 devices in the last year, 15% between 4 and 6 devices, 5% more than 7 devices and only 23% without devices. On average, at the sample level, respondents purchased 2.26 EEE products over a period of one year, with the intensity of purchases being higher among men, especially in the 18-29 age group. Consumers use different criteria in making their EEE purchase decision, and their importance was assessed using a five-level semantic differential, ranging from 1 - not at all important to 5 - very important. The analysis of the mean scores obtained (Figure no. 1) allows us to understand the order of importance of the factors that lead consumers to decide in the selection and purchase of EEE, namely: durability (mean 4.62), technical performance of the product (mean 4.61), price of the product (4.53), low energy consumption/energy efficiency (4.48), warranty offered (4.34), product innovation (4.03), brand (3.94), design or appearance (3.89), environmental impact of the product (3.83) and country of origin of the product (3.45).

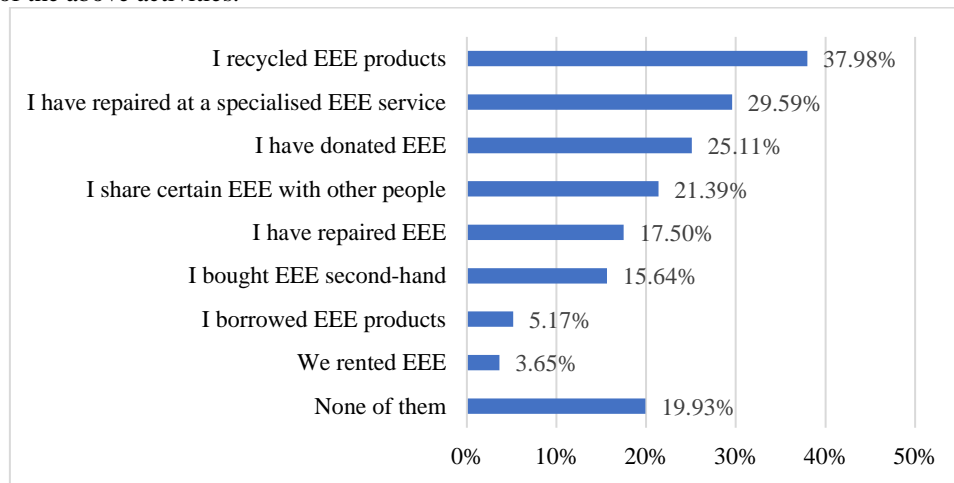


**Figure no. 1. Criteria that influence the purchasing decision for EEE**  
(1 - not at all important; 5 - very important)

As can be seen, consumers attach the greatest importance to durability and performance characteristics, which may suggest a certain readiness to use equipment over a longer period, as confirmed by the high importance attached to energy efficiency and warranty.

Another objective of the research was to find out which specific categories of circular economy actions consumers are involved in (Figure no. 2). Therefore, as EEE users, 37.98% of the respondents reported taking recycling actions, 29.59% used a specialised service to repair defective products to extend their life, 25.11% donated or offered such products to other people for reuse, and 21.39% are followers of the shared economy, in the sense of using certain electrical and electronic products with others. The percentage of people who have tested their skills to repair broken EEE products themselves is lower at 17.5%, while only

15.64% of the respondents have bought second-hand EEE products. The least frequent behaviours are borrowing EEE (5.17%) and renting EEE for their own needs (3.65%). The segment of people who do not show any involvement in circular economy actions seems to be rather modest, with only 19.93% of respondents stating that they have not carried out any of the above activities.



**Figure no. 2. Specific circular economy actions taken by consumers**

To understand consumer behavior regarding EEE replacement, specific situations that led respondents to exchange these products were first identified (Table no. 2). According to the survey results, 71% of respondents decide to replace an electrical or electronic equipment when it is defective and beyond repair, indicating, at least at the declarative level, a consumer orientation toward the functionality attributes of the products. Fashion and technological innovations do not appear to have a significant influence on the sample surveyed, with only 3% of respondents giving up products when they are out of fashion and 15% when a better performing model arrives. There is also evidence that consumers are concerned about the energy efficiency of EEE, with 17% of all respondents intending to replace their current EEE when more energy efficient models become available, which may demonstrate consumer concern about the challenges of the current energy crisis.

**Table no. 2. Situations of replacement of electrical or electronic equipment**

	Total	Men	Women	18-29 years	30-45 years	46-65 years
Total	1005	406	599	186	481	338
<b>When</b> it broke down	62%	61%	62%	61%	65%	59%
<b>When</b> it is defective and cannot be repaired or replaced	71%	74%	69%	68%	68%	76%
<b>When</b> a higher-performance model emerged	15%	14%	16%	12%	16%	17%
<b>When</b> a less energy-consuming model came out	17%	18%	17%	16%	16%	19%
<b>When</b> the product is out of fashion	3%	4%	1%	3%	3%	3%



The uses for which consumers put unused but serviceable products differ significantly depending on the type of EEE (Table no. 3).

**Table no. 3. Destinations for functional but unused products**

	<b>I sell it</b>	<b>I give it to another person</b>	<b>I recycle it</b>	<b>I am throwing it in the trash.</b>	<b>I keep it</b>	<b>I am donating it to an NGO</b>
<b>Large household appliances</b>	20%	35%	50%	4%	11%	12%
<b>Small household appliances</b>	15%	37%	40%	8%	19%	14%
<b>Computer equipment</b>	21%	36%	33%	4%	30%	13%
<b>Consumer electrical appliances</b>	21%	38%	39%	4%	21%	12%
<b>Lighting equipment</b>	10%	27%	38%	15%	19%	12%
<b>Tools and equipment</b>	16%	32%	26%	8%	25%	8%
<b>Toys and sports equipment</b>	15%	36%	19%	7%	16%	17%
<b>Medical devices</b>	9%	28%	27%	9%	23%	12%
<b>Monitoring and control tools</b>	10%	18%	32%	9%	16%	8%
<b>Automatic dispensers</b>	13%	29%	27%	7%	18%	9%

In the case of large household appliances (e.g., refrigerator, washing machine), most respondents are moving toward some form of reuse of products, given both the higher cost of these products and the larger surface area for their storage. Therefore, 50% of the respondents have resorted to recycling these appliances in specialised places, 35% have offered them to other people (friends, neighbours) for further use, and 20% have sold them to recover part of the purchase costs. Other destinations with lower frequency of occurrence in the sample surveyed were donating to an NGO or a cause (12% of respondents), keeping them at home (11% of respondents), throwing them in the bin or the garbage can (4% of respondents). For small household appliances (e.g., vacuum cleaner, toaster), there is also a high share of recycling behaviour in specialised places (40%) or giving to another person for reuse (37%), but a lower percentage of individuals reselling the products (15%) and a higher percentage of those choosing to keep them at home (19%). However, this information is expected, given the lower costs of buying small appliances and the ease of finding a storage place for them in the household. In the case of computer equipment (e.g., laptop, smartphone), most consumers choose to give the product to another person (36%), recycle it (33%) or keep it in the house (30%) to have a backup for products currently in use, with resale being an option for 21% of respondents. A similar trend is visible for consumer electrical appliances (e.g., TV, radio, video cameras), for which 39% of respondents choose to recycle, 38% give them to other people, 21% keep them at home, and 21% resell them. Regarding unused toys, they are generally given away to other people (36% of respondents), with the same behavior prevalent for medical devices (28% of respondents) or vending machines (29% of respondents).

The main reason consumers decide to discard some EEE products in working condition, choosing to replace them prematurely with new products, is technological advancement or the fast pace of product renewal, an argument indicated by 24% of all respondents. However, it should be noted that most of the respondents, 66%, stated that they do not discard EEE products until they no longer work, reflecting an apparent socially responsible behavior, but possibly in contradiction with the frequent EEE purchasing behaviour identified in the first objective. Of course, one explanation may lie in the different purchasing and usage behaviour of individuals depending on the category of equipment, more responsible in the case of expensive, high-volume appliances, and driven by a greater desire for diversity in the case of those with lower financial implications. Among the reasons for premature replacement of EEE mentioned less frequently by research participants were fashion influence (5%), manufacturer advertising (5%) and the need for esteem or social status (4%).

The importance of consumers to EEE repair and their attitude toward the possibility of repairing defective products was determined using statements measured on a 5-step Likert scale, from 1 - strongly disagree to 5 - strongly agree. Based on the results obtained, it was observed that there is a favorable attitude of consumers toward product repair activities in terms of favorable environmental impact (mean 3.91), with 41% of the respondents expressing total agreement and 24% agreeing with this statement. At the same time, the importance of repair activities is given by the fact that most people try to repair an electrical or electronic product if it breaks down, a statement that scored an average of 3.70, with similar percentages of respondents agreeing (26%) and strongly agreeing (32%). Finally, to identify possible barriers to repair activities, respondents expressed their opinion on the cost of a repair, where the resulting attitude was rather neutral (average 3.17), with 22% of respondents agreeing and 17% strongly agreeing that this cost is similar to that of a new product. Therefore, the possibilities for extending the use of products must consider the overall financial, time, and energy costs experienced by consumers during the life cycle of EEE, which may generate inconvenience for consumers and increased interest in new affordable offers.

Another objective of the investigation was to understand consumer behaviour regarding the disposal of nonfunctioning EEE products (Table no. 4). The results of the research showed multiple nuances of this behaviour, with differentiations given by product typology.

**Table no. 4. Destinations for defective/nonfunctional products**

	<b>I repair it myself</b>	<b>I am taking it in for service</b>	<b>I sell it</b>	<b>I give it to another person</b>	<b>I recycle it</b>	<b>I am throwing it in the trash.</b>	<b>I keep it</b>
<b>Large household appliances</b>	12%	38%	6%	13%	49%	6%	5%
<b>Small household appliances</b>	17%	29%	5%	15%	48%	10%	7%
<b>Computer equipment</b>	15%	39%	8%	16%	40%	5%	11%
<b>Consumer electrical appliances</b>	13%	36%	7%	15%	47%	7%	7%
<b>Lighting equipment</b>	14%	15%	4%	13%	46%	20%	6%
<b>Tools and equipment</b>	18%	29%	6%	13%	42%	10%	10%

	<b>I repair it myself</b>	<b>I am taking it in for service</b>	<b>I sell it</b>	<b>I give it to another person</b>	<b>I recycle it</b>	<b>I am throwing it in the trash.</b>	<b>I keep it</b>
<b>Toys and sports equipment</b>	12%	19%	5%	23%	39%	18%	8%
<b>Medical devices</b>	10%	19%	5%	11%	47%	17%	8%
<b>Monitoring and control tools</b>	10%	21%	5%	10%	48%	16%	7%
<b>Automatic dispensers</b>	12%	30%	6%	14%	46%	8%	7%

Therefore, the main options for large household appliances of respondents are recycling in specialised places (49%) and servicing (38%), and relatively few make the decision to keep them in the house without using them (5%) or to throw them away (6%). Even for small household appliances and non-functioning IT equipment, respondents have the same main options - recycling in specialised places (48% and 40%) and servicing (29% and 39%), but there are additional alternatives of repairing themselves or by a relative (17% and 15%), donating to another person (15% and 16%) or keeping them at home, not to be used (7% and 11%). Consumers are inclined to recycle and service EEE products of higher technical complexity and higher cost, while for other equipment, there is a lower level of commitment to extend or reuse their functionality. At the same time, the use of one's own skills or those of acquaintances in repairing certain EEE is more common for products of lower complexity in the category of small household appliances, IT equipment, tools, and utensils, and less so for consumer electrical appliances and large household appliances. Selling is an option considered for computer equipment (8%), consumer electrical appliances (7%), tools, and equipment (6%), but in lower proportions compared to donating to others. Items kept at home, no longer used, are usually computer equipment, tools and utensils, small household appliances, and medical devices. Disposal in the bin or dustbin is most common for lighting equipment (20%), toys and sports equipment (18%), medical devices (17%), monitoring and control instruments (16%), or small household appliances (10%).

Consumer reasons for not repairing defective products are in order of frequency of occurrence: high cost of repair (mentioned by 51% of respondents), high cost of spare parts (37% of respondents), unavailability of spare parts (27% of respondents), too much effort compared to the result (26% of respondents), lack of ability or skill to repair the product (25% of respondents), ease of purchasing a new product (21% of respondents), lack of confidence in the possibility of repairing products (14% of respondents), lack of time, convenience (11% of respondents), lack of information on authorised service centres (10% of respondents), lack of confidence in professional repair services (8% of respondents).

Consumer behaviour towards second-hand equipment was analyzed in terms of the frequency of purchase of these products compared to new EEE. The research results show a low usage of this category, with 43% of the respondents stating that they have never bought second-hand EEE products and 46% indicating a lower frequency of purchase compared to new equipment. Only 2% of the respondents buy second-hand EEE products more frequently than new products, while 9% reported a similar frequency. The reasons for buying second-hand EEE products are in order of respondents' mentions lower price (61%), less financial resources to buy a new product (31%), possibility to buy a branded product (27%), avoidance

of waste (20%), old products are perceived to be of better quality (19%), reduced negative environmental impact (16%), preference to old products (12%). The reasons for not buying second-hand EEE products are in order of respondents' mentions lack of warranty (45%), shorter life span (43%), concern about product quality (36%), second-hand products are not perceived as safe or hygienic (35%), new product is not considered much more expensive than second-hand (24%), not known where second-hand products can be bought (7%).

Summarizing the most relevant links with previous scientific research, we observe the existence of similar behaviors of Romanian consumers to those found in other geographical areas, regarding variables related to: the development of EEE consumption (Reportlinker, 2022), attitudes toward EEE reuse and repair with variations depending on the product categories (Chancerel, 2010; Ongondo and Williams, 2011; Cox et al., 2013), respectively motivations for not buying second-hand EEE products (Lyndhurst, 2011; Fortuna and Diyamandoglu, 2017). The main difference in the present research compared to previous studies conducted by other researchers (Babbitt et al., 2009; McCollough, 2009) concerns the situations in which consumers make the decision to replace EEE. Thus, the increased consumption of EEE products is a reality of the Romanian market, also present in many other areas and favoured by the changes generated by the COVID-19 pandemic in the teleworking sphere (Reportlinker, 2022). However, a peculiarity of Romanian consumer behaviour appears to be the more rational nature of EEE purchasing decisions, with more than 70% of individuals declaring that they replace electrical or electronic equipment when it is defective and cannot be repaired. Therefore, although studies by Babbitt et al. (2009) and McCollough (2009) have shown an important influence of fashion and technological advancement in premature replacement of EEE, the results of the present research do not confirm an equally high impact of these factors on consumer decisions, which can be explained by the lower purchasing power of certain segments of the population.

The involvement of Romanian consumers in repair and reuse actions depends significantly on the category of equipment in terms of product volume, cost, and ease of storage at the household level, a situation found in several research studies (Chancerel, 2010; Ongondo and Williams, 2011; Cox et al., 2013). Therefore, recycling and maintenance activities are more prevalent for large household appliances and IT equipment, while defective lighting equipment ends up in the trash more frequently. Donation to third parties is a circular economy activity that is more often practised for toys and sports equipment, and the use of one's own skills in repairing products is more common for tools and utensils and small household appliances. Most products kept at home fall into the category of IT equipment, medical devices, tools, and utensils. Selling, although not a common activity when compared to other product reuse actions, can still be found to a modest extent in computer equipment, consumer electrical appliances, and vending machines.

The frequency of purchasing second-hand EEE products is significantly lower compared to buying new products, and consumer motivations are similar to those found in other research findings, with a focus on image issues and distrust in the quality of these devices (Lyndhurst, 2011; Fortuna and Diyamandoglu, 2017).

## **Conclusions**

This paper has sought to highlight how consumers relate to the issue of the circular economy and the level of responsibility they assume as buyers and users of electrical and electronic equipment. To identify the degree to which consumers adopt sustainable consumption, both a series of factual variables relating to specific actions taken by consumers during the life cycle of products and attitudinal variables were investigated to gain an in-depth understanding of the motivations that lead consumers to take actions to extend the life of products or to take them out of use prematurely.

The information obtained from this research may be useful to manufacturers of electrical and electronic equipment in understanding consumers' expectations when purchasing these products. Therefore, as observed from the results of the study, the most important criteria considered by Romanian consumers in the purchase of EEE are the durability and technical performance of the products, information that manufacturers should use in their communication messages to attract the attention of consumers to attributes that are of great relevance to them.

The research results also show a different willingness of consumers to engage in specific activities of the circular economy. Consumer interest is mainly directed toward recycling and repair activities. Therefore, to further encourage these socially responsible behaviors, consumer education campaigns need to be developed, in which consumers are properly informed about specialized collection and recycling centres, recycling schemes, specific ways of separating products by category, or possible special places to take back EEE in specialised stores. Furthermore, there is a need for further involvement of manufacturers in efficient customer service and in communicating to the market the possibilities of reuse and life extension of products, as well as clear information on authorised service centres and the most common problems that may occur during the use of EEE. In other words, the focus on after-sales services should become more important during the lifetime of the products, enabling support to be provided to consumers in the process of using EEE, as well as reverse logistics for products to be taken out of use, to recover and make optimal use of component materials.

The limitations of the present research refer to the impossibility of extrapolating data on the rural population, due to its noninclusion in the sample investigated, as well as to the specific disadvantages of online surveys, of underrepresentation of people with a low rate of use of electronic technologies and platforms. Therefore, new research perspectives can aim to identify differences in behavioural patterns between rural and urban consumers in both the purchase and use of electrical and electronic equipment. Furthermore, future research directions may aim to achieve a higher degree of customisation of the investigated variables into narrower categories of specialisation in the EEE classification.

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