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Analysis of Habits of Consumers Related to e-Waste Considering the Knowledge of Brazilian National Policy of Solid Waste: A Comparison among White, Green, Brown and Blue Lines

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Abstract: Background: The increase in waste generation, caused by technological innovation and planned obsolescence has demanded strategies such as reverse logistics to mitigate the negative impacts on the environment. Objective: This paper analyzes the differences in the consumer's habits of the four lines of electrical and electronics, and the alterations in these habits considering the knowledge of legislation related to waste management. Methods: We conducted applied, exploratory, descriptive, and quantitative research. We performed a survey with Brazilian consumers of electrical and electronics equipment, through a questionnaire. To analyze data, we performed a logistic regression. Results: As the main results, we can highlight the probabilities of habits by line and the knowledge of legislation by habits, and confirm our study's two hypotheses. The first was related to the analysis of whether specific consumer habits tend to relate to particular lines of equipment and the second analyzes whether these habits tend to relate to knowledge of the legislation. Conclusion: We found that, depending on the type of e-waste, the participants of our study have different habits related to disposal and reverse logistics, and those with knowledge of the BPSW tend to have appropriate habits related to discard and reverse logistics. This paper can be helpful because it discusses the existing differences in the habits of the participants considering the lines and knowledge of legislation.

Keywords: Brazilian Polity of Solid Waste; consumer habits; e-waste; electrical and electronic waste; WEEE

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1. Introduction

Electrical and electronic equipment (EEE) is among the most consumed products globally. Thus, the resulting generation of waste, i.e., the waste of electrical and electronics (WEEE), or simply e-waste, reached a global record in 2019 [1]. Technological innovation has driven planned obsolescence, which increases the demand for electronics, while also contributing to more significant waste generation [2,3].

In addition to the volume of waste, other major concerns are its associated dangers and toxicity. The e-waste cannot be discarded in landfills, given its content of heavy metals such as lead, mercury and cadmium, organic material, and rare earth metals. These characteristics make e-waste dangerous for human health while also ensuring it has tremendous economic potential for revaluation [4–6].

When analyzing the policies related to the management of e-waste in developed and developing countries, it is essential to consider the differences concerning population density and income because these factors affect the generation of e-waste [6]. Echegaray

and Hansstein [7] noted that, in addition to the need for appropriate policies and legislation for the management of e-waste, consumer awareness about recycling is an essential factor to be considered. Guarnieri et al. [8] pointed out several existing barriers in developing countries related to e-waste management that should be taken into account by policymakers, practitioners, and researchers interested in the study of this topic.

Several studies have been conducted in recent years on e-waste management. Some of these focused on the reverse logistics of e-waste [4,5,8–11], and others on the possibilities of revalorization of e-waste [6,12,13]. Some focused on recycling [2,14,15].

More recently, Koshta, Patra, and Singh [16] approached the sharing economic responsibility related to reverse logistics and circular economy of e-waste according to the end-users' perspective. Gilal et al. [17] studied consumer e-waste disposal behavior through a systematic literature review. Garcia and van Langen [18] analyzed the role of consumers in the urban mining of e-waste. Several studies were conducted on the consumers' habits; however, to the best of our knowledge, the habits of consumers related to the disposal and reverse logistics of e-waste, and the knowledge of Brazilian legislation pertaining to e-waste considering the different types of electrical and electronics, have not been examined yet.

Considering this research gap, this study aimed to analyze the differences in the consumer habits of the four lines of electrical and electronics (white, green, brown, and blue) established by the Brazilian Agency of Industrial Development (BAID, or in Portuguese ABDI) and the alterations in these habits considering the knowledge of Brazilian Policy of Solid Waste Management—BPSWM. To achieve this objective, we constructed an online questionnaire using Google forms based on Likert scales having five points. The sample of respondents was non-probabilistic, defined by the criteria of accessibility and convenience. We disseminated the questionnaire through social media (Facebook, LinkedIn, Instagram, WhatsApp) and e-mail. To collect data, we conducted four studies, one for each line (category) of electrical and electronics. Brazil enacted legislation related to waste management [19] in 2010. Subsequently, several alterations concerning reverse logistics occurred in Brazil. Under the shared responsibility principle, all the productive chains, including consumers/citizens are responsible, so a sectoral agreement was signed with the Brazilian Government to enable the reverse logistics of e-waste within the law.

The study aimed to analyze two hypotheses:

Hypothesis 1 (H1). *The consumers' habits related to disposal tend to relate to particular lines of equipment (green, blue, white, and brown).*

Hypothesis 2 (H2). *The consumers' behavior tends to relate to knowledge (or not) of the environmental legislation (BPSWM, Brazil).*

Consumers are among the actors involved in the shared responsibility who own the electronics at the time of disposal. Some authors attribute the e-waste crisis's severity to consumers' low participation in ensuring the proper disposal of such materials [20]. Thus, one of the main challenges of e-waste management is the lack of consumer involvement, and motivating and promoting recycling behaviors are fundamental to solve this issue [7,20].

It is essential to highlight that electrical and electronic equipment (EEE) covers both electrical and electronic equipment, and are all products whose operation depends on the use of an electrical current or an electromagnetic field. This equipment can be classified into four broad categories (lines): (i) white line; (ii) brown line; (iii) blue line; (iv) green line [21].

As main results, we can highlight that there is a different probability (greater or lesser) of certain habits prevailing in some consumer electronics lines; thus, we confirmed the two hypotheses proposed for this study, related to the analysis of whether the specific consumer habits tend to relate to particular lines of equipment (H1), and whether these habits tend to relate to knowledge of the BPSWM (H2). Considering these hypotheses, we found that, depending on the type of e-waste, the participants of our study have different habits related to disposal and reverse logistics.

Considering that BPSW establishes penalties and obligations for all actors involved in the generation and managing of the e-waste, thus implicitly including consumers, when the consumer knows about BPSW, he/she tends to have appropriate habits related to discard and reverse logistics.

Understanding the habits of consumers can provide insights to managers and policy-makers to address policies of environmental awareness and education. This may contribute to the increase in the rates of e-waste collected, since the consumer is considered an important stakeholder in the reverse logistics.

This paper is organized as follows. This section presents the contextualization of the topic exploited, the research gap and problem, and the objective of the study. Section 2 presents a literature review with the main concepts related to WEEE, reverse logistics and legislation, and consumer behavior. Section 3 describes the methodological procedures used to collect and analyze the data. Section 4 discusses the results and Section 5 presents the concluding remarks, limitations, and suggestions for further studies.

2. Literature Review

2.1. Waste Electrical and Electronic Equipment (WEEE) or e-Waste

Waste electrical and electronic equipment, or e-waste, can be understood as any object whose performance depends on an electrical current or magnetic field, and that will be disposed of by its owner [22,23]. WEEE, also called electronic waste or e-waste, comprises products resulting from the disposal of electronic equipment, and associated parts and pieces, that have lost their value to their owners, reached the end of their useful life, or are no longer used [24–26].

Due to its composition, the inadequate disposal of WEEE can generate some risks such as health problems to humans and animals and damage to the environment, in addition to global warming [26]. This has negative repercussions not only in environmental terms, but also in economic and social terms [27].

In addition, according to the report The Global E-waste Monitor 2020, the world generation of e-waste increased in 2019. In 2016, Brazil generated waste equivalent to 7.4 kg per capita [28]. In 2019, 2143 kilo tons (kT) of e-waste was generated, equivalent to 10.2 kg per capita. Thus, Brazil was the second-largest generator of this waste in the Americas, only behind the United States of America [1]. The management of e-waste has therefore become one of the most significant challenges faced by humanity [27].

According to The Global e-waste 2020 report, the exposure to toxins present in heavy metals from e-waste, in addition to the damage to human health in general, is even more harmful to children and babies. This fact is due to their vulnerability and unique susceptibility to environmental toxins, and contact with informal recycling, which is present mainly in developing countries [1].

In Brazil, e-waste is grouped into four lines (categories) according to the ABDI classification: (i) brown line, (ii) green line, (iii) white line and (iv) blue line. The brown line encompasses medium-sized electrical and electronic equipment (weighing between 1 and 35 kg) with a useful life of between 5 and 13 years, consisting mainly of plastic and glass. The white goods comprise large equipment (between 30 and 70 kg) with a useful life of between 10 and 15 years, such as refrigerators and washing machines. The green line includes small equipment (between 0.09 and 30 kg) such as notebooks and cell phones, which has a useful life of 2 to 5 years and is composed of metals and plastic. However, the blue line also includes small equipment (between 0.5 and 5 kg), such as drills and blenders, having with a longer useful life, from 10 to 12 years, and a main composition of plastic, [21].

The reverse logistics process is able to operationalize the return of the WEEE, to be reconditioned or used by the recycling industry. In Brazil, there is specific legislation for this purpose. The following section presents the main issues related to this topic.

2.2. Reverse Logistics and Environmental Legislation in Brazil

References to terms "reverse logistics", "reverse channel", or "reverse flow" can be found in the international literature since the 1970s, primarily related to recycling [29]. Pioneer authors in this field established concepts related to reverse logistics. Stock [30] stated that reverse logistics fulfil the role of logistics related to recycling, waste disposal, and hazardous materials management. In a broader view, the topic includes all issues related to logistical activities responsible for source reduction, recycling, replacement, material reuse, and disposal.

Rogers and Tibben-Lembke [31] pointed out that reverse logistics is the process of planning, implementing, and controlling the flow of raw materials, process inventories, and finished products, in addition to their information, from the point of consumption to the point of origin, to recapture value or dispose of it properly.

In 2004, the Council of Reverse Logistics [32] stated that "reverse logistics is a movement of materials from a typical final consumption in an opposite direction to regain value or disposal of waste. This reverse activity includes taking back damaged products, renewal and enlargement of inventories through product take back remanufacturing of packaging materials, reuse of containers, renovation of products, and handling of obsolete appliances".

Guarnieri, Silva, and Levino [4] highlighted some difficulties or barriers in implementing reverse logistics. Among them are: (i) the lack of computerized systems that integrate reverse logistics into the direct distribution flow; (ii) the lack of financial and economic information systems that measure the impact of returns and revenues from products and materials, in addition to the investments and expenses incurred in the process; (iii) the deficiency of the logistical infrastructure; and (iv) the lack of knowledge/planning.

Despite the barriers, Brazil achieved some advances in recent years related to reverse logistics due to the enaction of the Brazilian Policy of Solid Waste Management (Law 12,305/2010), which was pioneer environmental legislation within Latin American and Caribbean countries. Among other principles, the law establishes the shared responsibility of the actors involved in the supply chain of EEE with waste management. Reverse logistics is recognized by the Brazilian Policy of Solid Waste Management as the main instrument to comply with the law. Another essential instrument, the sectoral agreement, involves producers, distributors, retailers, importers, consumers, and the government in the implementation to reverse logistics [19].

In 2019, the sectoral agreement for the implementation of the reverse logistics of e-waste was signed by the Brazilian Government, through the Ministry of Environment and the management companies, the Brazilian Association for Recycling of Electronics and Household Appliances, and the National Waste Electrical and Electronic Equipment Manager, named Green Electron [33].

The sectoral agreement proposed to comply with the return of electrical and electronics for recycling and evolve over time in steps of implementation and operationalization. It was signed so that producers, distributors, importers, and retailers are required by article 33 of law 12,305/2010 to implement reverse logistics systems, regardless of the public cleaning service and solid waste management. The agreement participants recognize that sharing solutions and optimizing resources contribute to achieving the established goals. The agreement also describes the responsibility of each actor involved in the generation and disposal of the e-waste, including the consumers, which are financially responsible for the reverse logistics. Environmental education programs are also specified in the agreement to ensure the actions related to reverse logistics of e-waste are sustainable [33]. Although the legislation and initiatives related to e-waste in Brazil are still in their early stages, we recognize that many other countries already have consolidated practices related to this matter; for example, in Europe, there are many WEEE directives addressing the reverse logistics and the discard of several types of e-waste.

Introducing reverse logistics requires a redesign of processes, products, and distribution channels in the supply chain, implying complex interactions between companies

and other participants [34], such as collaboration with customers and suppliers, third parties, competitors, and institutions of research [35]. In Brazil, from the point of view of consumers of second-hand electrical and electronic equipment (EEE), the analysis of the external aspects indicates that cultural and legal issues are barriers that can hinder the implementation of LR [10].

Concerning the role of consumers in reverse logistics, Santana et al. [36] analyzed the LR process of the cell phone manufacturing industry in Brazil. They found that, in addition to policies and legislation that encourage awareness of consumers related to reverse logistics, companies should also adopt proactive measures to make this practice attractive to consumers, such as "buy-back" [36]. Testoni, Guarnieri, and Filippi [37] and Moreira and Guarnieri [38] studied the adoption of consumer´s loyalty programs to motivate the reverse logistics in the segment of beauty products. However, they found some evidence that this practice is also used in the electronics segment, especially with the green line of electronics (computers, printers, and cell phones).

Concerning shared responsibility and the role of consumers, article 35 of the BPSWM requires that, when there is a selective collection system, consumers are required to "appropriately make available reusable and recyclable solid waste for collection or return" [19]. For developing nations, informal recycling has the potential to make an even more valuable contribution to the recycling of e-waste if their operations can be brought into line with required modern safety standards. This aspect can be recognized as a significant challenge and entails high costs associated with this commitment [39].

Considering the influence of consumers in the correct disposal of waste and, consequently, to enable conditions to conduct the reverse logistics processes, the next section presents elements related to the consumer behavior regarding the disposal of e-waste.

2.3. Consumer Behaviour Related to the Disposal of e-Waste

In addition to the need for appropriate policies and legislation, recent studies have emphasized consumer awareness of e-waste management [7]. First, regarding the reasons for replacing EEE, Islam et al. [40] identified three categories: malfunction, technological obsolescence, and demand for additional resources, of which the first two reasons were more evident in European developed countries, and the last was seen from the context of developing countries. By comparison, Echegaray [41] found that Brazilian consumers easily adopt disposable practices, replacing EEE because of the appeal of new technologies, aesthetics, or fashion, instead of decreasing performance or technical failures.

Concerning the recycling of e-waste, Dhir et al. [20] highlighted that the intentions of Japanese consumers are affected by the compatibility of values, environmental concerns, and the perceived benefits of engaging in this behavior. By comparison, Echegaray and Hansstein [7] showed that a favorable view of recycling and the perception of social acceptance explain the intention to recycle. Despite this, only a minority of respondents adopt adequate recycling practices, which represent a socially distorted behavior among the highest income groups in Brazilian society [7]. Additionally, Islam et al. [40] identified critical barriers to e-waste recycling, such as lack of information, encouragement, and convenience.

Santos et al. [3] found that cell phone consumers already expect the device to last for a shorter period than that advertised. The leading cause for replacement is planned obsolescence, and the main outcome for older equipment is storage or donation. These findings corroborates the study of Cunha et al. [42], who, when analyzing the e-waste from the green line, identified that consumers do not perform the disposal correctly, which may be linked to the fact that consumers do not seek the relevant information. Pessanha and Morales [43] also noted a lack of information regarding disposal. However, the analyzed consumers (regarding cell phones, computers, and tablets) are concerned about the correct disposal.

Although some studies have dealt with consumer behavior and e-waste, none of these have distinguished the electronics by line and considered the knowledge of legislation

as a factor that enables the correct disposal. The following section describes the main procedures to collect and analyze the data of this paper.

3. Methods and Research Design

This study can be classified as descriptive and quantitative. We conducted a survey to collect primary data from Brazilian consumers related to reverse logistics of e-waste considering knowledge of the Brazilian Policy of Solid Waste (BPSWM) as a factor that enables correct disposal. To collect data, we devised a questionnaire based on Likert-type scales having five points, ranging from 1 (the lowest level) to 5 (the highest level). Then, we conducted four studies for each line (category) of electrical and electronic equipment defined by ABDI (2013): white, green, brown, and blue lines. In order to be included, the respondents of each study had to meet the following criteria: being Brazilian, having or already had EEE belonging to one of the four lines (in the questionnaire, some examples were presented), and agreeing to participate using a brief Term of Free and Informed Consent (TCLE).

We excluded duplicate responses from each database, those who did not agree to participating in the research, and those under 18. Thus, the study obtained 1509 valid responses: N = 452 from the green line, N = 379 from the brown line, N = 389 from the white line, and N = 286 from the blue line, as shown in Table 1 (see Appendix A). Samples were predominantly female for all lines, and between 18 and 25 years old, except for the blue line. The blue line involved more people over the age of 31. Additionally, the respondents were residents of 2627 federative units in the states of Brazil and the Federal District, with the latter having with the highest number of respondents.

Table 1. Characterization of the sample by line of EEE.

		Green	Brown	White	Blue
Sex	Female	68.8%	64.4%	65.3%	73.8%
	Male	31.2%	35.6%	34. 2%	26.2%
Age	18–25	52.4%	36.7%	44.5%	19.2%
	26–30	15.0%	17.9%	17.5%	19.6%
	31–40	17.0%	14.8%	14.4%	21.0%
	>40	15.5%	30.6%	23.7%	40.2%
Income	Less than USD 33,533	8.4%	11.6%	15.7%	9.1%
	USD 33,534 to 83,831	30.3%	27.4%	20.1%	23.4%
	USD 83,832 to 167,368	27.4%	25.6%	27.5%	25.2%
	USD 167,369 to 334,737	20.8%	21.4%	27.5%	30.1%
	Above USD 334,738 *	8.4%	11.6%	15.7%	12.2%
Schooling	Primary education	0.2%	0.3%	0.3%	0%
	Secondary education	0%	0.8%	0.3%	1.4%
	Further education	49.1%	36.4%	44.7%	22.7%
	Higher education	24.4%	30.1%	28.0%	29.7%
	Post-graduate	26.3%	32.4%	26.7%	46.2%
Knowledge on BPSWM	Do know the BPSWM	43.4%	36.7%	29.8%	42.3%
	Do not know the BPSWM	56.6%	63.3%	70.2%	57.7%
	Total	452	379	389	286

* We considered the quotation of USD of 29 December 2021.

The first questionnaire was initially designed to analyze the green line based on the study by Santos and Guarnieri [44], with adaptations. The questionnaire was analyzed, and the semantic validation was conducted by experts (professors from universities and research institutions, and professionals working in the area of logistics in Brazil). The questionnaire was available only in the Portuguese language. We conducted a pre-test to verify the coherence, validity, wording, and clarity [43]. Some improvements were implemented after the validation by experts and the pre-test with a small sample of respondents. Then, we

adopted the same questionnaire for the other lines; we used it as a model, with minor adaptations.

This study was exempted from being submitted to the university's ethics committee, considering that it did not involve a sensitive topic or a vulnerable population, and did not carry out experiments with human beings or animals. Thus, the consent form was presented in order to guarantee the rights of the participants and ensure anonymity in responses, following the guidelines of the Brazilian Council of Research Ethics.

In addition to the Term of Consent, we divided the questionnaire (Supplementary Materials) into five sections: (1) Habits and perceptions; (2) Brazilian Policy of Solid Waste Policy (BPSWM); (3) Manufacturers; (4) Dealers; and (5) Characterization of respondents. The present study focused on data related to the consumer behavior concerning each line of EEE, knowledge of the BPSWM, and sociodemographic data.

Specifically, the first section presented questions about the durability of the EEE, the exchange habits, and the final destination of the equipment. Section 2 comprised two options for questions: for those who knew and for those who did not know the BPSWM. Finally, Section 3 presented sociodemographic questions for the characterization of the sample. To integrate the four independent questionnaires, we used the variables that had the same semantic meaning and with the same construction of the response scales, and the other questionnaires were not considered.

Concerning the limitations of the study, the sample of respondents was non-probabilistic, defined by the criteria of accessibility and convenience. We broadly disseminated the questionnaire through social media (Facebook, LinkedIn, Instagram, WhatsApp) and e-mail, for all profiles of consumers, which means that we did not restrict the questionnaire by age, gender, location, or education level. The return of questionnaires occurred observing the accessibility criteria, which means that we collected data from consumers who agreed to answer our questionnaire. We did not perform cluster analysis, so the sample was not homogeneous. This can be recognized as a limitation of our study because it can affect the accuracy of the results; however, we emphasize that this is an acceptable limitation, considering that our intention was not generalize the results.

The surveys were conducted by researchers located in Brasília (Distrito Federal), at different times, as part of a research project. Although we obtained responses from several Brazilian states, we did not obtain a representative percentage of each one, which can be recognized as a limitation of this study. The semantic validation of the scale used by experts and pre-tests can also be highlighted as a limitation of our study. We also do not discuss the results of each category, because the primary purpose of this study was to compare the habits of the consumers considering the types of electronics and the knowledge of Brazilian legislation. The Brazilian legislation was not compared with that of other countries, since it was not the focus of our paper.

We also did not analyze all actors involved in the shared responsibility or sectorial agreement of e-waste because other papers previously examined this topic [4]. Thus, the only actor approached in this study was the consumer, rather than the e-waste producers, dealers, and recyclers. Furthermore, a question identifying the equipment that was being evaluated, which was not used in the questionnaires in this study, was able to be used as a control variable. Finally, the respondent's perception of their knowledge of the BPSWM was used, and the elements of the legislation known by the respondents were not considered. This can be analyzed in future studies.

Considering the schedule of the research project, the data of the green line was collected in May 2018, that of the brown line was collected from December 2018 to January 2019. The data of the white line was collected from April to May 2019, and that of the blue line was collected between July and September 2021.

To analyze the collected data in regard to the two hypothesis ((H1): the consumers' habits related to disposal tend to relate to particular lines of equipment (green, blue, white, and brown); and (H2): the consumers' behavior tends to relate to knowledge of the environmental legislation (BPSWM, Brazil)) we performed a logistic regression, given that

the dependent variable (DV) is categorical, and thus can be used to predict the probability of occurrence of a particular event [45]. Specifically, we conducted a logistic regression for each hypothesis: (1) multinomial regression to determine the probability of a habit being in a specific line (green, brown, white, and blue); and (2) binomial regression to determine how habits change if there is knowledge of the BPSWM. For this purpose, we used the Jamovi version 2.0.0 software [46]. Specifically, we present each regression's dependent and independent variables in Table 2.

Table 2. Dependent and independent variables by logistic regression.

	Regression 1 (Multinomial)	**Regression 2 (Binomial)**
DV	Line (Green, brown, white, blue)	BPSWM (Know or do not know)
IV	HAB_1—When I buy electronics, I expect them to last a long time. HAB_2—The durability of my electronics usually reflects what I expected when I bought them HAB_3—When I replace an electronic device, I look for information on how to dispose of the old one HAB_4—I discard electronic in common trash HAB_5—Ease of access to disposal sites is important when disposing of an electronics HAB_6—I only buy new electronics when the old one no longer works HAB_7—I care about the environment when disposing of electronics HAB_8—I know the composition and degree of dangerousness of the electronics that are in my possession HAB_9—I know proper electronics disposal sites DES_1—When I replace electronics, I believe in giving the correct destination to the old ones Replacement—In which situation do you usually replace electronics? SOC_AGE—Age	

4. Results Presentation and Analysis

4.1. Regression 1—Habits per Line (Green, Brown, White, and Blue Lines) of e-Waste

The results of the multinomial logistic regression between the dependent variables—DV (green, brown, white and blue lines) and the independent variables—IV (habits) are presented in this section. These regressions aimed to identify whether habits are more likely to occur when associated with a particular line. It is noteworthy that the adoption of a reference category is an assumption of the multinomial logistic regression method. Thus, the green line was used as a reference and comparison category, as it was the first questionnaire applied and because it involves smaller electronics, such as cell phones and notebooks. Thus, for regression model 1, the pseudo-R^2 of Nagelkerke (R2N) was 0.260, evidencing the explanatory power of the model was 26%, which was significant at a level lower than 1%. Table 3 presents the results of the multinomial logistic regression for the significant results (see Appendix B for the full table).

Considering the estimated parameters presented in Table 3, the observed data demonstrate that there is a different probability (greater or lesser) of certain habits prevailing in some consumer electronics lines. In general, analyzing the green line as a reference, it is noted that there is a higher probability of habits HAB_1, HAB_2, HAB_4, HAB_6, and HAB_7 being associated with the green line compared to the blue and white lines. Thus, the habits "when I buy an electronics I expect it to last a long time" (HAB_1; ODA = 1.62; 95% CI = 1.16–2.26; ODB = 2.16; 95% CI = 1.57–2.98), "the durability of my electronics they usually reflect what I expected when I bought them" (HAB_2; ODA = 1.49; 95% CI = 1.26–1.76; ODB = 1.41; 95% CI = 1.21–1.63), and "I care about the environment when disposing of an electronic appliance" (HAB_7); ODA = 1.24; 95% CI = 1.02–1.52; ODB = 1.26; 95% CI = 1.05–1.51) are associated with an increased probability of being on the green line when compared to the blue and white lines.

By comparison, the chance of being related to the green line, when compared to the brown line, is only greater for habits HAB_4 and HAB_6. Thus, there is a greater probability of the consumer "only buying new electronics when the old one no longer works" (HAB_6; ODM = 1.18; 95% CI = 1.02–1.36) and "throwing electronics in the trash"

(HAB_4; ODM = 1.33; 95% CI = 1.16–1.52) when associated with the green line, in relation to the brown line.

Table 3. Multinomial logistic regression results.

							Confidence Interval of 95%	
Line	**Variable**	**Estimate**	**Standard Error**	**Wald (Z)**	***p*-Value**	**Odds Ratio**	**Inferior Limit**	**Upper Limit**
Blue	Constant	−5.2086	0.9547	−5.4559	<0.001 ***	0.00547	8.42×10^{-4}	0.0355
	HAB_1	0.4852	0.1693	2.8654	0.004 ***	1.62457	1.16571	2.2641
	HAB_2	0.4003	0.0843	4.7508	<0.001 ***	1.49221	1.26507	1.7601
	HAB_4	0.5121	0.0792	6.4679	<0.001 ***	1.66880	1.42892	1.9489
	HAB_5	−0.7313	0.0671	−10.8918	<0.001 ***	0.48130	0.42196	0.5490
	HAB_6	0.4907	0.0959	5.1197	<0.001 ***	1.63354	1.35374	1.9712
	HAB_7	0.2198	0.1028	2.1384	0.032 **	1.24584	1.01851	1.5239
	HAB_8	−0.3795	0.0830	−4.5698	<0.001 ***	0.68422	0.58145	0.8052
	DES_1: 1–2	−0.6888	0.2214	−3.1119	0.002 ***	0.50216	0.32540	0.7749
White	Constant	−37874	0.8754	−4.3265	<0.001 ***	0.02265	0.00407	0.1260
	HAB_1	0.7743	0.1630	4.7512	<0.001 ***	2.16902	1.57597	2.9852
	HAB_2	0.3442	0.0758	4.5412	<0.001 ***	1.41091	1.21612	1.6369
	HAB_3	−0.1663	0.0711	−2.3373	0.019 **	0.84680	0.73658	0.9735
	HAB_4	0.2886	0.0759	3.8037	<0.001 ***	1.33458	1.15016	1.5486
	HAB_5	−0.6841	0.0599	−11.4169	<0.001 ***	0.50454	0.44863	0.5674
	HAB_6	0.3108	0.0800	3.8834	<0.001 ***	1.36456	1.16644	1.5963
	HAB_7	0.2319	0.0917	2.5295	0.011 **	1.26094	1.05359	1.5091
	HAB_8	−0.2113	0.0733	−2.8806	0.004 ***	0.80956	0.70116	0.9347
	HAB_9	−0.4117	0.0751	−5.4833	<0.001 ***	0.66255	0.57189	0.7676
	DES_1: 1–2	0.7639	0.1865	4.0967	<0.001 ***	2.14658	1.48946	3.0936
Brown	Constant	−2.7280	0.6757	−4.0373	<0.001 ***	0.06535	0.01738	0.2457
	HAB_4	0.2859	0.0703	40679	<0.001 ***	1.33096	1.15968	1.5275
	HAB_6	0.1670	0.0735	22710	0.023 **	1.18176	1.02314	1.3650
	HAB_9	−0.1964	0.0666	−29513	0.003 ***	0.82165	0.72116	0.9361
	DES_1: 1–2	0.6063	0.1730	3.5035	<0.001 ***	1.83359	1.30618	2.5740
McFadden R^2		0.201	Chi-square (X^2)		831			
Cox & Snell R^2		0.129	Degree of freedom		57			
Nagelkerke R^2		0.260	*p*-value		<0.001			

Note. Estimates represent green line probabilities as reference level (mobile phone, notebook); *** Significant at the 1% level; ** Significant at the 5% level.

As presented in Table 3, the chance of the consumer being related to the green line is smaller for HAB_5 and HAB_8 when compared to both the blue and the white line, for HAB_9 when compared to the white line and the brown line, and for HAB_3 when compared to the white line only. Despite this, it is important to determine how habits change when there is knowledge of the Brazilian Policy of Solid Waste Management, which is presented in the following section.

4.2. Regression 2—Knowledge about the Brazilian Policy of Solid Waste Management (BPSWM) per Line (Green, Brown, White and Blue Lines) of e-Waste

The binomial logistic regression results between the dependent variable—DV (knowledge about the BPSWM or not) and the independent variable—IV (habits) are presented in this section. By means of these regressions, it was intended to verify which habits are more likely among consumers who know the BPSWM. For model 2, the R2N was 0.289, in

which the proposed model explains 28.9% of the model in relation to the null model, with a significance of 1% (see Table 4).

Table 4. Results of binary logistic regression.

Coefficient	Estimate	Standard Error	Wald (Z)	*p*-Value	Odds Ratio	Confidence Interval 95%	
						Inferior Limit	Superior Limit
Constant	−32.154	0.6177	−5.205	<0.001 ***	0.0401	0.0120	0.135
HAB_1	−0.0286	0.1061	−0.270	0.787	0.9718	0.7893	1.196
HAB_2	−0.1898	0.0556	−3.413	<0.001 ***	0.8271	0.7417	0.922
HAB_3	0.1610	0.0516	3.121	0.002 ***	1.1747	1.0617	1.300
HAB_4	−0.0870	0.0561	−1.550	0.121	0.9167	0.8212	1.023
HAB_5	−0.0411	0.0414	−0.994	0.320	0.9597	0.8849	1.041
HAB_6	0.1500	0.0622	2.411	0.016 **	1.1618	1.0285	1.313
HAB_7	0.0367	0.0735	0.499	0.618	1.0374	0.8982	1.198
HAB_8	0.4186	0.0527	7.947	<0.001 ***	1.5198	1.3708	1.685
HAB_9	0.3079	0.0527	5.840	<0.001 ***	1.3606	1.2270	1.509
Replacement							
5–1	1.0580	0.5189	2.039	0.041 **	2.8806	1.0419	7.964
SOC_AGE:							
2–1	0.6539	0.1743	3.751	<0.001 ***	1.9231	1.3665	2.706
3–1	0.8027	0.1788	4.488	<0.001 ***	2.2317	1.5718	3.169
4–1	0.5339	0.1551	3.442	<0.001 ***	1.7056	1.2585	2.312
DES_1:							
1–2	−0.3876	0.1424	−2.722	0.006 ***	0.6787	0.5134	0.897
2–1	0.3876	0.1424	2.722	0.006 ***	1.4734	1.1147	1.948
McFadden R^2		0.180		Chi-Square (X^2)		360	
Cox & Snell R^2		0.213		Degree of freedom		16	
Nagelkerke R^2		0.289		*p*-value		<0.001 ***	

Note. Estimates represent the probabilities of "BPSWM = Know" vs. "BPSWM = Don't know"; *** Significant at the 1% level; ** Significant at the 5% level.

In general, when considering the estimated parameters presented in Table 4, the observed data demonstrate that there is a different probability (higher and lower) of certain habits when consumers know the BPSWM compared to those who do not. It was observed that the habits HAB_2, HAB_3, HAB_8, and HAB_9 were significant at 1% for explaining knowledge of the BPSWM, whereas HAB_6 was at 5%. Specifically, the chance (odds ratio) of knowing the BPSWM weas lower (OR = 0.8271; 95% CI = 0.74–0.92) related to consumers who perceive that durability usually reflects what the consumer expected when compared (HAB_2) with those who did not know the BPSWM. When considering disposal habits, the search for information on how to dispose of old equipment (HAB_3) was associated with an increase in the probability of consumers knowing the BPSWM by 17.47% (OD = 1.17; 95% CI = 1.06–1.30). In addition, the chance of knowing the BPSWM was greater among consumers who: (1) only buy a new electronic appliance when the old one no longer works (HAB_6; OD = 1.16; 95% CI = 1.03–1.3); (2) who know the existing components and the degree of danger of electronics (HAB_8; OD = 1.52; 95% CI = 1.37–1.68); and (3) who know proper electronics disposal sites (HAB_9; OD = 1.36; 95% CI = 1.22–1.51).

Additionally, believing that old electronics are disposed correctly (DES_1) was associated with a 47.34% reduction in the probability of consumers knowing the BPSWM. In other words, the chance of knowing the BPSWM is greater (OD = 1.4734; 95% CI = 1.11–1.95) in individuals who do not believe they have the correct destination (DES_1). Finally, when evaluating the replacement situation, the chance of knowing the BPSWM is greater (OD = 2.8806; 95% CI = 1.04–7.96) considering the consumers who change their electronics when the repair is expensive or not available (REPLACEMENT—situation 5) compared to those who change when they have defects (REPLACEMENT—situation 1).

Regarding the hypotheses—(H1): the consumers' habits related to disposal tend to relate to particular lines of equipment (green, blue, white, and brown); and (H2)—the consumers' behavior tends to relate to knowledge of the environmental legislation

(BPSWM, Brazil), the present study confirmed both H1 and H2. Specifically, when analyzing hypothesis 1 (H1), it was noted that habits 1, 2, 4, 6, and 7 are more likely to be adopted in relation to electronics from the green line compared to the white and blue lines. By comparison, the chance of being related to the green line when compared to the brown line is only higher for habits 4 and 6. Thus, it is understood that few habits predict to be for the green line compared to the brown line, signaling that there is a similar behavior of consumers in relation to other habits. This is consistent with the findings of Islam et al. [41] and Echegaray [42] in relation to replacement for malfunction, for which this habit is different for equipment such as cell phones and notebooks when compared to other equipment (TVs, refrigerators, mixers). Furthermore, corroborating the study of Rodrigues et al. [47], who identified a variation in the destination according to the type of e-waste, small equipment was mostly discarded in the common garbage.

Regarding hypothesis 2 (H2), it was observed that the chance of knowing the BPSWM was greater among consumers seeking information on how to discard the old device one (habit 3); who only buy a new one when the old one does not work (habit 6); who know the components and the degree of hazards (habit 8); and who know suitable disposal sites (habit 9). Despite this, this knowledge does not seem to have been reflected in the effective correct disposal, as it was found that consumers who know the BPSWM are more likely not to believe that they correctly dispose of old electronics, while there is a greater probability that those who do not know the BPSWM believe they have made the correct destination. This fact shows that consumers are more aware of the correct destination, even if not put into practice, as also identified by Echegaray and Hansstein [7]. This perception of consumers of not giving the correct destination may be due to barriers such as lack of information, encouragement, and convenience [10,41].

5. Discussion of the Results

Knowing the habits of the consumers is essential to aiding decision makers, such as producers, distributors, importers, and retailers of EEE, to adopt proactive strategies to incentivize consumers to take back the e-waste. Santana et al. [36] corroborated this result when they stated that, in addition to policies and legislation that encourage awareness of consumers related to reverse logistics, companies should also adopt proactive measures to make this practice attractive to consumers, such as "buy-back" [36]. Testoni, Guarnieri and Filippi [38] and Moreira and Guarnieri [39] studied the adoption of consumer's loyalty programs and found a similar result in the segment of beauty products. The study of Shevchenko, Laitala and Danko [48] explored the incentives to enable and increase consumer collection rates for end-of-life electrical and electronic equipment. Based on literature reviews, a previous study [48] suggested the use of bonus card systems to achieve this purpose. Other studies [38,39,48] agreed that this type of incentive can increase the collection rates and enable the reverse logistics of e-waste.

The existence of policies, guidelines, and legislation can impel consumers to act correctly when discarding the e-waste, as we found in our results. Some studies found similar results when studying the e-waste in general [7]. This was advanced in this study when compared to previous published studies, because we conducted four separate studies to compare the data related to the habits of consumers considering the type of EEE. We believe that thinking about each line can generate more accurate results, since the consumers can easily correlate their discard habits with the specificities of the types of e-waste. It is important to emphasize that studies examining consumers' habits may not be innovative in developed countries, which already have a consolidated process of reverse logistics, such as the WEEE directives in Europe. However, when we consider the specific situation of Latin American and the Caribbean countries, which are in the early stages of this process, too much work us required related to the environmental awareness and education of the consumers, as in the case of Brazil. Although Brazil is considered a pioneer in the Latin American and the Caribbean countries concerning formal policies of e-waste, as

mentioned by [4,6,8,40], there is no robust program related to the environmental awareness and education conducted by companies and the government.

Related to the main means of discard, it is also important to differentiate the most common destinations in developed and developing countries. Although, in developed countries, most people return products to the manufacturer or reseller [40], in developing countries, the second-hand market is very active (considering the donation and selling). In addition to the income level, which is low and affects the purchasing power, many stores recondition EEE appliances in developing countries, which provides income for a considerable part of the population. In this context, it is possible to find informal workers, individual entrepreneurs, small, medium, and non-governmental organizations (digital inclusion), and big companies working in this sector. Thus, the consumers prefer to recondition, sell, and donate the e-waste. This fact can generate some problems regarding the transparency in the supply chain of EEE, since the actors involved in the shared responsibility and sectorial agreements do not necessarily know the condition of the e-waste at its end of life. Despite of the lack of information and traceability of the e-waste, there is a positive impact in the second-hand market, considering that the reconditioning extends the life cycle of the EEE and avoids increasing disposal rates. Related to the reasons to discard, we did not perform the analysis in this study as performed by Echegaray [41], which found that Brazilian consumers discard electronics due to the appeal of new technologies, aesthetics, or fashion changes.

The result related to the awareness of the legislation contributing to reverse logistics was corroborated in part by the study of Dhir et al. [20]. Echegaray and Hansstein [7] found that a favorable view of recycling and the need for social acceptance can explain the intention to recycle. Santos et al. [3] and Pessanha and Morales [43] found that many manufacturers and resellers did not make available information related to the reverse logistics on websites, which can perhaps affect the correct disposal and discard of the e-waste. Cunha et al. [42] found that consumers do not perform the disposal correctly because they do not seek the information. In this regard, our findings indicate that the knowledge on the legislation is also important to motivate the correct environmental habits of e-waste. A previous study [49] used the behavioral reasoning theory (BRT) to study e-waste recycling attitudes and intentions, and provided a detailed understanding of the relative influence of facilitators and inhibitors towards e-waste recycling.

The BPSWM establishes that consumers also have the responsibility to correctly discard the e-waste, being subject to penalties if they do not. In addition, the sectoral agreement signed by the stakeholders involved in the generation and management of e-waste in 2019 establishes that consumers also have financial responsibility for reverse logistics. Therefore, we observed that knowing the legislation and related instruments also changed the consumer habits related to our study participants. Most of the published studies focus on one line of e-waste or even general e-waste; as we stated previously, by conducting separated studies we can analyze the habits by line, considering the particular characteristics, making it easier for consumers to identify their habits regarding e-waste, and providing insights to managers and public policy makers to propose specific strategies related to the environmental awareness and education programs, loyalty strategies, and public and private policies related to reverse logistics.

6. Conclusions

We analyzed the habits by line and the knowledge of BPSWM by habit, and found that there is a different probability (greater or lesser) of certain habits prevailing in some consumer electronics lines; we also confirmed our study's two hypotheses. The first (H1) related to the analysis of whether specific consumer the habits tend to relate to particular lines of equipment; the second (H2) analyzed if these habits tend to relate to knowledge or not of the BPSWM. Considering that, in Brazil, ABDI sets the EEE in four main lines, and the size, weight, and characteristics of each line differ from each other, we corroborated that, depending on the type of e-waste, the participants of our study have different habits.

First, gaps arise in order to highlight the specifics of each line when considering consumer behavior. Thus, new studies can further investigate the characteristics of each line, such as the composition, weight, and durability of the EEE in each line. Additionally, new studies may investigate why consumers who know the BPSWM believe they are not properly disposing of such equipment, with the aim of better understanding what would be preventing these people from applying their knowledge in practice and making the correct disposal of electronic waste. Future studies can validate the scale statistically, using a well-known protocol for that, commonly used by studies in the areas of Marketing and psychometric studies.

This study contributes by providing insights into the habits of consumers by line, which can be helpful to managers and practitioners acting in this field. It also can be helpful to policymakers from Brazil acting in the formalization of e-waste management. Knowing the habits, and whether the knowledge of BPSW affects these habits, can be important to create policies related to environmental awareness and education. Thus, the companies may propose some loyalty programs to incentive the reverse logistics of e-waste by line. In addition, this study can be helpful for researchers interested in this topic because we highlight some possibilities for future studies.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su141811557/s1, Instrument of data collection S1.

Author Contributions: Conceptualization: B.d.O.V., G.C. and P.G.; methodology: P.G. and B.d.O.V.; validation: P.G., L.C.e.S. and S.A.; data collection, P.G. and B.d.O.V.; formal analysis: B.d.O.V. and G.C.; writing—original draft preparation, B.d.O.V., G.C. and P.G.; writing—review and editing, P.G., L.C.e.S. and S.A.; supervision: P.G. and S.A.; project administration: P.G.; funding acquisition, P.G., S.A. and L.C.e.S. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: Ethical review and approval were waived for this study due to involve just the opinions of consumers and due to not involve any experiment.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Data sharing does not apply to this article as no datasets were generated or analyzed during the current study.

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Conflicts of Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Variation Inflation Factor Test (VIF)

Variable	VIF
HAB_1	1.07
HAB_2	1.03
HAB_3	1.20
HAB_4	1.15
HAB_5	1.02
HAB_6	1.11
HAB_7	1.20
HAB_8	1.11
HAB_9	1.19
SOC_AGE	1.02
REPLACEMENT	1.01
DES_1	1.17

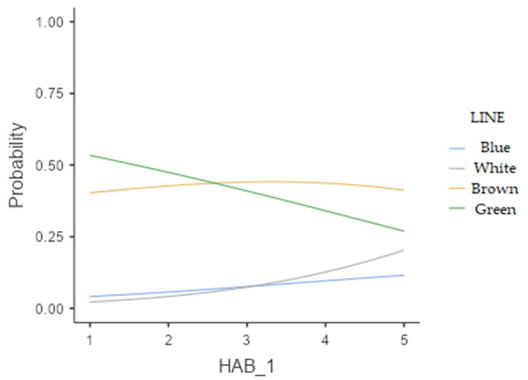
Appendix B. Complete Multinomial Logistic Regression

							Confidence Interval of 95%	
Line	**Variable**	**Estimate**	**Standard Error**	**Wald (Z)**	***p*-Value**	**Odd Ratio**	**Inferior Limit**	**Superior Limit**
Blue	Constant	−5.2086	0.9547	−5.4559	<0.001 ***	0.00547	8.42×10^{-4}	0.0355
	HAB_1	0.4852	0.1693	2.8654	0.004 ***	1.62457	1.16571	2.2641
	HAB_2	0.4003	0.0843	4.7508	<0.001 ***	1.49221	1.26507	1.7601
	HAB_3	0.0794	0.0794	1.0005	0.317	1.08264	0.92667	1.2649
	HAB_4	0.5121	0.0792	6.4679	<0.001 ***	1.66880	1.42892	1.9489
	HAB_5	−0.7313	0.0671	−10.8918	<0.001 ***	0.48130	0.42196	0.5490
	HAB_6	0.4907	0.0959	5.1197	<0.001 ***	1.63354	1.35374	1.9712
	HAB_7	0.2198	0.1028	2.1384	0.032 **	1.24584	1.01851	1.5239
	HAB_8	−0.3795	0.0830	−4.5698	<0.001 ***	0.68422	0.58145	0.8052
	HAB_9	−0.0840	0.0830	−1.0126	0.311	0.91944	0.78148	1.0818
	SOC_AGE:							
	2–1	1.2607	0.2614	4.8239	<0.001 ***	3.52805	2.11382	5.8885
	3–1	1.0662	0.2628	4.0574	<0.001 ***	2.90432	1.73528	4.8609
	4–1	2.3367	0.2507	9.3202	<0.001 ***	10.34717	6.33012	16.9134
	DES_1:							
	1–2	−0.6888	0.2214	−3.1119	0.002 ***	0.50216	0.32540	0.7749
White	Constant	−37874	0.8754	−4.3265	<0.001 ***	0.02265	0.00407	0.1260
	HAB_1	0.7743	0.1630	4.7512	<0.001 ***	2.16902	1.57597	2.9852
	HAB_2	0.3442	0.0758	4.5412	<0.001 ***	1.41091	1.21612	1.6369
	HAB_3	−0.1663	0.0711	−2.3373	0.019 **	0.84680	0.73658	0.9735
	HAB_4	0.2886	0.0759	3.8037	<0.001 ***	1.33458	1.15016	1.5486
	HAB_5	−0.6841	0.0599	−11.4169	<0.001 ***	0.50454	0.44863	0.5674
	HAB_6	0.3108	0.0800	3.8834	<0.001 ***	1.36456	1.16644	1.5963
	HAB_7	0.2319	0.0917	2.5295	0.011 **	1.26094	1.05359	1.5091
	HAB_8	−0.2113	0.0733	−2.8806	0.004 ***	0.80956	0.70116	0.9347
	HAB_9	−0.4117	0.0751	−5.4833	<0.001 ***	0.66255	0.57189	0.7676
	SOC_AGE:							
	2–1	0.3577	0.2254	1.5869	0.113	1.43006	0.91934	2.2245
	3–1	0.0346	0.2369	0.1461	0.884	1.03521	0.65074	1.6468
	4–1	1.0448	0.2247	4.6507	<0.001 ***	2.84295	1.83036	4.4157
	REPLACEMENT:							
	1–3	0.3866	0.1779	2.173	0.030	1.47192	1.03867	2.0859
	DES_1:							
	1–2	0.7639	0.1865	4.0967	<0.001 ***	2.14658	1.48946	3.0936
Brown	Constante	−2.7280	0.6757	−4.0373	<0.001 ***	0.06535	0.01738	0.2457
	HAB_1	0.2076	0.1206	17208	0.085	1.23070	0.97156	1.5590
	HAB_2	0.0276	0.0671	0.4111	0.681	1.02795	0.90134	1.1723
	HAB_3	0.0507	0.0658	0.7701	0.441	1.05198	0.92469	1.1968
	HAB_4	0.2859	0.0703	40679	<0.001 ***	1.33096	1.15968	1.5275
	HAB_5	0.0621	0.0614	10111	0.312	1.06403	0.94342	1.2001
	HAB_6	0.1670	0.0735	22710	0.023 **	1.18176	1.02314	1.3650
	HAB_7	0.0630	0.0876	0.7196	0.472	1.06506	0.89704	1.2646
	HAB_8	−0.0841	0.0653	−12873	0.198	0.91932	0.80881	1.0449
	HAB_9	−0.1964	0.0666	−29513	0.003 ***	0.82165	0.72116	0.9361
	SOC_AGE:							
	2–1	0.5102	0.2112	2.4154	0.016 **	1.66556	1.10098	2.5197
	3–1	0.1836	0.2169	0.8464	0.397	1.20149	0.78545	1.8379
	4–1	1.2099	0.2002	6.0436	<0.001 ***	3.35322	2.26492	4.9644
	REPLACEMENT:							
	2–1	11245	0.4065	27663	0.006 ***	307863	1.38788	6.8291
	1–3	0.5082	0.1638	3101	0.002 ***	1.66224	1.20566	2.2917
	2–3	1.6326	0.3983	4099	<0.001 ***	5.11715	2.34429	11.1698
	4–3	1.2869	0.5300	2.428	0.015 **	3.62148	1.28168	10.2327
	2–5	1.4555	0.6671	2.182	0.029 **	4.28680	1.15952	15.8486
	2–6	1.8027	0.8963	2.011	0.044 **	6.06580	1.04706	35.1403
	DES_1:							
	1–2	0.6063	0.1730	3.5035	<0.001 ***	1.83359	1.30618	2.5740
	McFadden R^2	0.201	Chi-square (X^2)		831			
	Cox & Snell R^2	0.129	Degree of freedom		57			
	Nagelkerke R^2	0.260	*p*-value		<0.001			

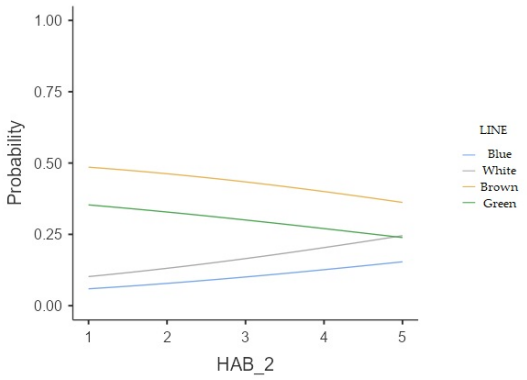
* The green line was used as a reference (mobile phones, notebook). ** *p* 0.05, *** *p* 0.01.

Appendix C. Estimated Marginal Means of Multinomial Logistic Regression

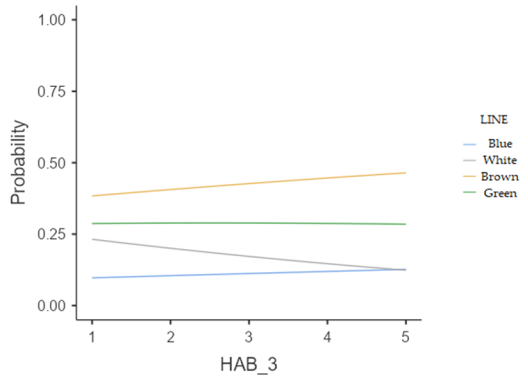
Habits



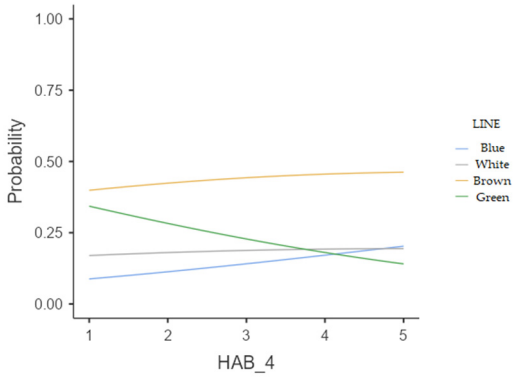
"When I buy electronics, I expect it to last a long time."



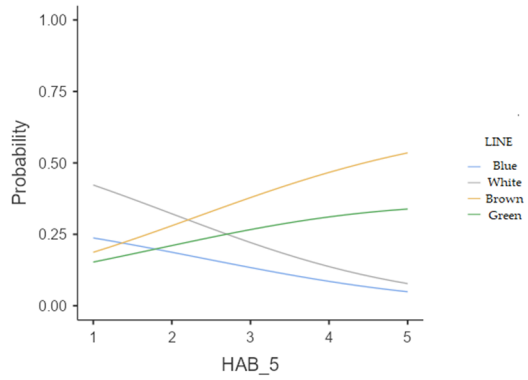
"The durability of my electronics usually reflects what I expected when I bought them"



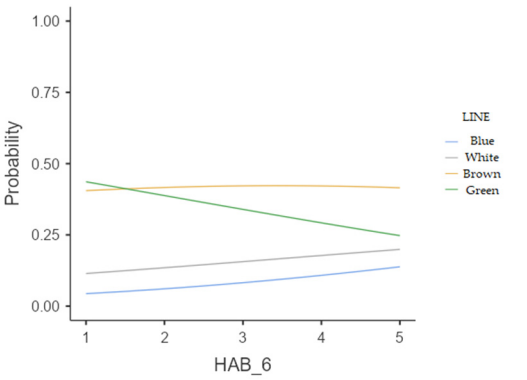
"When I change an electronic device, I look for information on how to dispose of the old one"



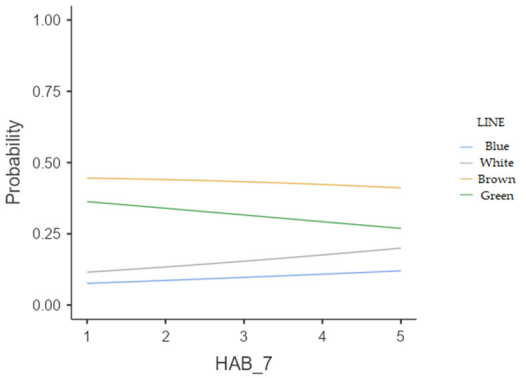
"I discard electronics in common trash"



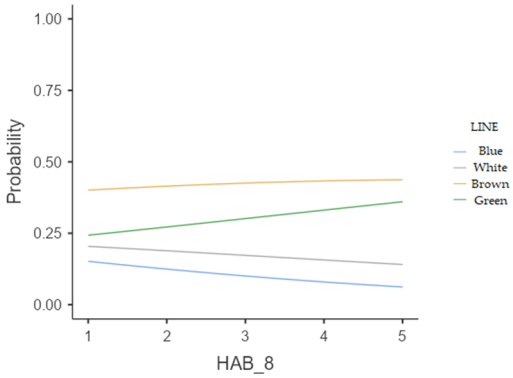
"Ease of access to disposal sites is important when disposing of an electronics"



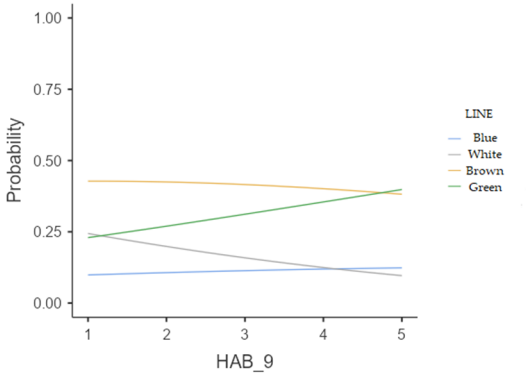
"I only buy new electronics when the old one no longer works"



"I care about the environment when disposing of electronics"



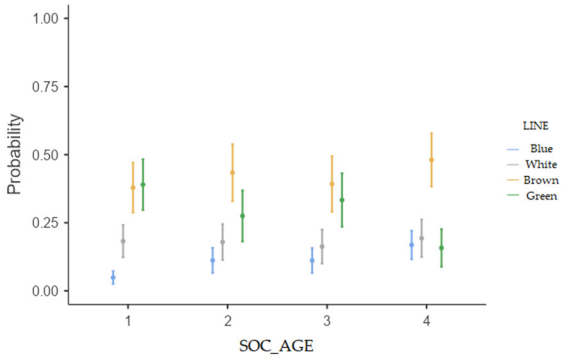
"I know the composition and degree of dangerousness of the electronics that are in my possession"



"I know proper electronics disposal sites"

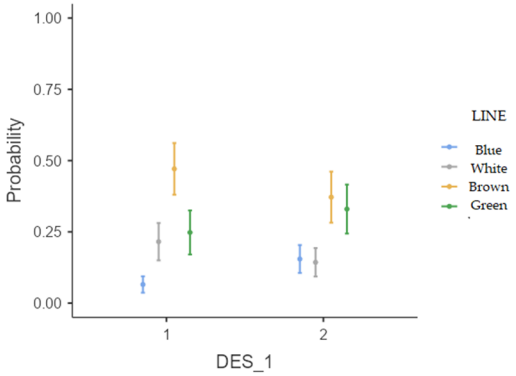
Likert scale: 1 (Totally disagree)–5 (Totally agree)

Age



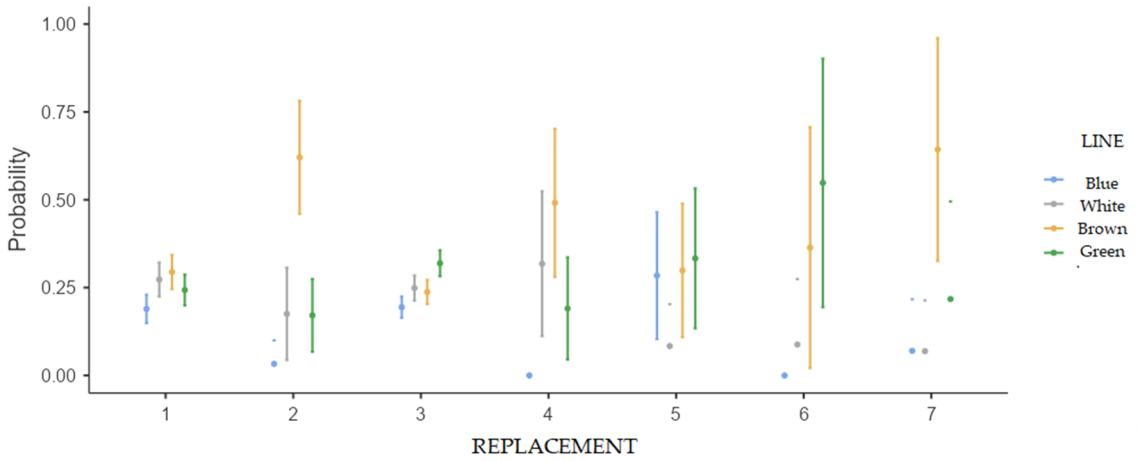
1—Between 18 and 25 years; 2—Between 26 and 30 years; 3—Between 31 and 40 years; 4—Under 40 years

Destination



1—Yes; 2—No

Situation of Replacement



1—When the appliance has defects
2—When it has been in use for a long time and has no defects
3—When it has been in use for a long time and has defects
4—When a new version is released on the market
5—When the repair is expensive or not
6—When it becomes obsolete7—Others.

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