Journal of Management and Sustainability; Vol. 12, No. 1; 2022
ISSN 1925-4725 E-ISSN 1925-4733
Published by Canadian Center of Science and Education

Reverse Logistics: An Analysis of Business Communication on Discarding Electrical Bicycle Batteries

Pâmela Gabriela Blanco de Mattos[1] & Daiane Rodrigues dos Santos[1,2]

[1] Universidade Veiga de Almeida, Rio de Janeiro, Brasil

[2] Universidade Estadual do Rio de Jaeiro, Rio de Janeiro, Brasil

Correspondence: Daiane Rodrigues dos Santos, Rio de Janeiro State University, Street São Francisco Xavier, 524 - Maracanã, Rio de Janeiro - RJ, 20550-0132, Brasil.

Received: April 6, 2022 Accepted: May 15, 2022 Online Published: May 23, 2022

doi:10.5539/jms.v12n1p158 URL: https://doi.org/10.5539/jms.v12n1p158

Abstract

Reverse post-consumer logistics is a process that consists of returning certain goods to the production chain. There is to provide an appropriate and sustainable destination for a series of items that would most likely be discarded inappropriately. Since the sanction of the National Solid Waste Policy in 2010, it has been mandatory for companies to structure reverse logistics programs and communicate to their consumers about what to do after the end of their products. Four Brazilian companies in electric bicycle manufacturers have become the object of this study. We did research through the consumer's view of this good to diagnose the communication of reverse logistics programs of the chosen companies. In addition, the study was complemented with an analysis of the potential market, identifying whether reverse logistics is a competitive advantage. The results show that the four studied companies are not in accordance with current legislation. Through the questionnaire results with 238 people, we conclude that it is a competitive advantage for the company to disclose the destination of its post-consumption product.

Keywords: reverse logistics, communication, battery, electric bicycle, sustainability

1. Introduction

At the beginning of the 21st century, electric energy storage technologies passed through innovations capable of bringing viability to the use of the electric vehicle as a means of transportation. Electric bicycles appear in this panorama since they seek the concept of no emission of pollutants and greenhouse gases during their operation (Cardoso, 2018).

According to the data from the Electric Bicycle Market Bulletin developed by Alliance Bike Brazil, there has been an increase since 2016 in the electric bicycle market, reaching 32,110 new units in 2020. In 2021 the projection varied from 39,500 to 43,000 units, increasing up to 34% (Alianca, 2021).

Despite the advantages, the batteries can take the discussion to a different path. It is the device that stores energy and feeds the electric motor for motion generation. The life cycle is proportional to the number of recharges carried out. The average durability is about three years, and it is necessary to replace the part (Mendes, 2021).

Thus, the concern to reverse logistics gains space in the discussion of environmental management. Reverse logistics is an area of business logistics that plans and operates, controls the flow and return information of after-sales and consumption goods through reverse distribution channels, adding the value of different nature: economic, ecological, legal, Logistics, corporate image, and others (Leite, 2002).

The legislation is a means of stimulation and obligation for those responsible for acting in the management of these products. Currently, the rule that deals with the disposal and disposal of batteries are resolution 401/2008 of the National Council of the Environment (CONAMA) and the National Policy on Solid Waste (PNRS). This is Law 12,305/10, which aims at the national waste disposal organization. Its requirements include those manufacturers, importers, distributors, traders, consumers, and the public have shared responsibility for the waste arising from the post-consumer products (FIEP, 2013). With the PNRS, reverse logistics appears to enable the reuse of solid waste from the country's productive processes, reducing the amount incorrectly discarded (MMA, 2016).

According to NBR 10.004, batteries are classified as Class one Hazardous Waste. They are those materials that pose risks to health and the environment, requiring special treatment and disposal according to their flammability characteristics, corrosivity, and reactivity (ABNT, 2004). Companies must disclose information about their products to guide their consumers on the correct destination and means to return the after-consumer goods.

2. Reverse Logistic

Reverse logistics is composed of several necessary processes. The goal is to restore a product that the client wants to discard, reuse, or resell. The restoration of the product in the productive cycle is an influential process since it enables to add value to the company (Fernandes, 2021). Reverse logistics is an area that is part of business logistics. This area concerns the forms of return of a product, productive or business flow, to add value to retardant of after-sales and post-consumer goods (Nikolaou, 2021).

According to Mattos (2020), post-consumer reverse logistics is a process that consists of returning goods to their production chain after consumption. It offers a suitable and sustainable destination for several items that otherwise would most likely be inadequately disposed of. Second (Alkahtani et al., 2021), reverse logistics (RLs) refers to the set of activities needed by consumers to collect the product used for reuse, repair, remanufacturing, recycling, or disposal of the used product.

For Leite (2017), reverse logistics increases the economic and environmental benefits of reuse and recycling activities since most post-consumer materials have added value in the secondary market. Post-consumer reverse distribution channels include returning end-of-life products, which must be recycled, reused, dismantled, or disposed of correctly (Acosta, Wegner, & Padula, 2008).

Second (Moraes, Rocha, & Ewald, 2014), the main reason for carrying out post-consumer reverse logistics are legal and environmental issues. In developed countries, three factors explain the greater interest of the business community in the implementation of reverse logistics: ecological legislation, benefits for the company image, and competitiveness. Nikolaou et al. (2021) added economic factors and environmental issues. Reverse logistics can bring economic, social, and ecological benefits, positively influencing corporate image and customer satisfaction (Fernandes et al., 2021).

To Stock and Mulki (2009), companies seeking to implement reverse logistics anticipate changes in environmental legislation and adapt their processes to the new consumer profile, given the advance of green marketing. When implementing reverse logistics in developing countries, some challenges are met: Lack of economic incentives, legislation, law enforcement capacity, and lack of awareness of the population, according to (Demajorovic, Augusto, & Souza, 2016).

Another challenge may be leadership and its lack of interest in this topic or disbelief in the importance of communication. Communication favors work cooperation between those involved, mainly the final consumer. The lack of awareness reports such as campaigns and promotional activities justifies the ineffectiveness of reverse logistics programs. People must be informed and encouraged to return batteries at the end of their lifespan (Demajouovic et al., 2012).

3. Integrated Marketing Communication (CIM)

The CIM is how companies seek to inform, persuade, and remind consumers, directly and indirectly, about products and brand marketing. Integrated marketing strategies position content that the brand wishes to disclose clearly, cohesive, and complete in different channels, so there is no different understanding of the purpose (Demajouovic et al., 2012). For Villaverde (2019), Integrated marketing communications is the use of marketing strategies to optimize the communication of a consistent message of the company's brands.

Integrated Marketing Communications presents ways to gain consistency in the image of the product, brand, or company, obtained through the planning of the message. Bernyte (2018) identified that one of the main reasons companies adopt management practices in the environmental area is improving image and reputation. The practice of green marketing is decisive for this goal to be answered. The image improvement of a company is linked to the differentials and values added to the products.

According to Kliatchko (2008), four pillars are based on the CIM, which are part of the communication coordination process, with its target audience as guidance. The pillars are Stakeholders, Content, Channels, and Results; together, they achieve the objectives of the CIM. The first, Stakeholder, refers to the various audiences interacting with the company. It encompasses current and future customers, consumers, government agencies, employees, managers, and others who interact directly or indirectly.

Kotler and Keller (2013) say that the content pillar is a way to attract audiences. In this pillar, the content must

be creative, persuasive, and planned so that the message is encouraged to the consumer and makes him understand that it is part of the company's value. The Channels pillar encompasses the means of contact so that the consumer has access to the message that wants to be passed. The content pillar is interconnected with the channel pillar, as the company must offer through channels the content that consumers are looking for.

The last pillar of the CIM, Results, focuses on assessing how the communication programmer impacted the people who received the information. The evaluation has a feature known as the Key Performance Indicator (KPI). In the case of evaluating the results of the communication of reverse logistics programs, the most appropriate indicator is behavior to assess the change and trend of consumer behavior.

The four pillars build the goal of the CIM to create a strategy to generate an image that shapes the behavior of the target audience (Bernyte, 2018). Thus, the planning of mandatory communication established by PNRS, based on CIM, becomes the primary strategy to bring the necessary knowledge to consumers (Stock & Mulki, 2009).

4. The Research

This article aims to identify how certain companies' manufacturers of electric bicycles in Brazil communicate to their consumers the existence of reverse logistics programs and strategies for the batteries of their bicycles after the end of the life cycle useful product.

The study universe is the electric bicycle market in Brazil. The chosen companies are: Lev Bicicletas, Sousa Motos, Rio South and Bicicletas Blitz. The study was conducted around the information on the disposal of electric batteries passed on to consumers.

On the following topics are the detailed search results for each channel.

4.1 Canal Website

This research aimed to find information on discarding and recycling electrical batteries, the fate of the material that will be collected, maleficence about the incorrect disposal, and the benefits of reverse logistics. The website search was done with each page, tab, and document analysis.

According to Table 1, the analysis of the websites shows that none of the companies studied openly present any information regarding the reverse logistics, disposal, or recycling of electric bicycle batteries.

Table 1. The arrangement of channels

Informations about:	**Blitz**	**Lev Bicicletas**	**Rio South**	**Sousa Motos**
Reverse logistics on the homepage	No	No	No	No
Disposal of batteries on the home page	No	No	No	No
Recycling of batteries on the homepage	No	No	No	No
Disposal of batteries on the site	Yes	No	No	No
Recycling of batteries on the site	No	No	No	No
Programs of reverse logistics	No	No	No	No
Battery Discard Places	Yes	No	No	No
Destination of product collected	No	No	No	No
Detrimental effects of inadequate disposal of batteries	Yes	No	No	No
Benefits of recycling for the environment	No	No	No	No

Source: Own elaboration according to websites.

When accessing each tab of the sites, the company Blitz was the only one who presented battery disposal information on the "Blog" tab. Despite knowing, the company leaves vague as disposal and recycling are done and does not quote any reverse logistics program or destination of the products collected.

About the harmful effects of inappropriate disposal, the company did not mention the effects of the type of battery marking, which is the lithium battery. None of the websites presented any information about the benefits of recycling.

4.2 Electronic Mail Channel

Through e-mail, a guide of questions was prepared that seeks to answer questions about the existence of reverse logistics programs, disposal and destination of electric bicycle batteries, and knowledge about the current legislation. The e-mail addresses were made available on the websites. The itinerary has the questions presented

down.

- How can I discard the battery of my electric bicycle?
- Are there any programs of logistics reverse of these batteries?
- What is the destiny of the discarded batteries?
- Do you recycle the batteries? How is it performed?
- In case there is an outsourced company, how do they discard them? What are the names of the enterprise, and in which periodicity the batteries are collected?
- Are the enterprises aware of the Brazilian Law n. 12.305/10 (National Politics of Solid Residues - PNRS)?

Sousa Motos, replied that the partner companies' resellers of batteries have registration at IBAMA (Brazilian Institute of the Environment and Renewable Natural) and are authorized to collect, route, and recycle the batteries of electric bicycles. The value of the scrap price for recycling was reported, but there was no explanation of the process.

Lev Bicicletas responded that it is responsible for all the bicycle parts, so the disposal should be done in their stores. After collecting, an unnamed partner collects and evaluates the condition of the battery components. If they are damaged, they are sent to specific disposal points. In case of good condition, they are reused in smaller factories.

The companies Blitz and Rio South did not respond, demonstrating the lack of effectiveness of the message on this channel.

4.3 Canal SAC

For the SAC, the employees responsible for the care of each company were interviewed. The same script was applied via e-mail, through contact via phone, or Whatsapp made available on websites.

The contact with Blitz was on Whatsapp. They say that the disposal of batteries should be done in their physical stores. The official said he has no type of reverse logistics program and is unaware of the legislation. After the consumer is disposed of in their store, the batteries are forwarded to the responsibility of the third-party company, Energy Source. This company will continue the disposal process by making the withdrawal of Blitz physical stores. The outsourced company does the battery recycling procedure by Whatsapp.

The Lev reported that the battery could be left in one of its stores, and a third-party company, whose name is unknown, disposed of it after collecting the batteries in the stores. It was not informed if the contracted company carried out the recycling of batteries, and there is no reverse logistics program. The official did not know the legislation.

The Sousa Motos was contacted through the phone available on its website. As their factory is in Manaus, they said to dispose of their batteries; you must send them to their address. The customer pays the cost. It is not detailed if the recycling is done. The employee had knowledge about the PNRS.

No contact with Rio South. The phone was not working.

4.4 Technical Support

Following the electronic mail channel and SAC route, an interview was done with the employees present in the store to evaluate this channel.

At the Rio South store, employees reported that disposal should be done in one of their stores. A third-party company collects and recycles the functional parts of the battery. There is no reverse logistics program. The employees did not know about the legislation.

In the Lev Bicicletas shop, it was answered that the disposal must be carried out in any of their stores or should be contacted by the service for the collection of parts made available for free. Each month the subsidiaries forward their batteries to a third-party company. They detailed that the company evaluates the components, reuses those in good condition, and makes the correct disposal of the remaining components. There are no reverse logistics programs, and employees are unaware of the legislation.

Sousa Motos technical assistance was present. The employee said to dispose of it just dropped in the store and they forward to the factory in Manaus. The official revealed that he did not have detailed information on the disposal or recycling of these batteries. There is no knowledge of reverse logistics programs or legislation.

Blitz's technical assistance employee reported that the batteries must be forwarded to one of the units. Every

month, an outsourced company unknown to them realizes the collection of these batteries and makes the correct recycling and destination of the waste. There are no reverse logistics programs or knowledge about the legislation of the interviewee.

4.5 Questionnaire

This research was performed with a sample of individuals willing to answer a questionnaire that seeks to respond to the disposal means of electrical batteries after the end of their use, in addition to assessing their initiatives in search of information on the subject and carrying out a market analysis potential market with possible consumers. The questionnaire sought the public who has electric bicycles or is interested in buying them. Disclosed on the date of November 22, 2021, obtained 238 respondents.

Figure 1 shows that among the respondents, 88.2 % reside in the southeast region of Brazil, followed by 5.9 % in the south region, the western center in 3.4 % of the region, and 2.6 % divided between the regions north and northeast.

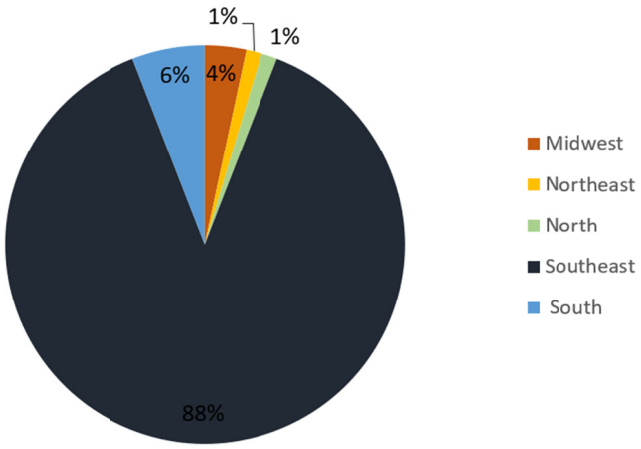

Figure 1. Region of Brazil where you live

Source: Prepared by the authors.

Figure 2 illustrates the range of family income of the interviewees; 69.1% have their family income above three minimum wages, demonstrating that social class and having an electric bicycle can be interconnected.

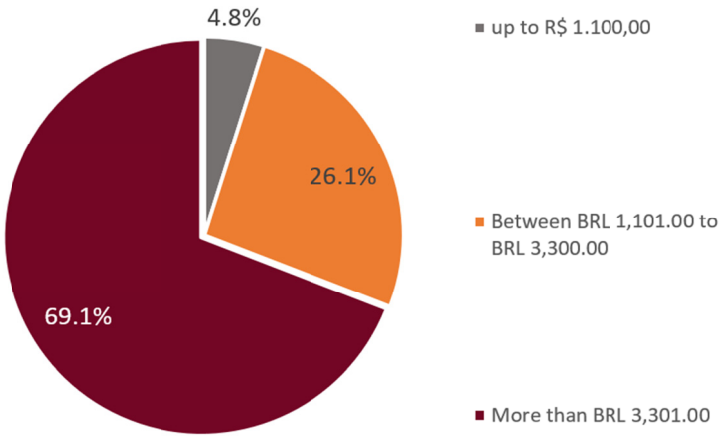

Figure 2. Family income range of the interviewees

Source: Prepared by the authors.

Table 2 shows that 31 have or had an electric bicycle among all respondents.

Table 2. Consumers or potential consumers (respondents)

Do you have or have you had an electric bicycle?		
Yes	31	13.0%
No	207	87.0%

Source: Prepared by the authors.

Among the 31 who answered "Yes" to the previous question, it can be observed in Figure 3 that 18 have completed higher education. This will analyze whether schooling is related to environmental awareness.

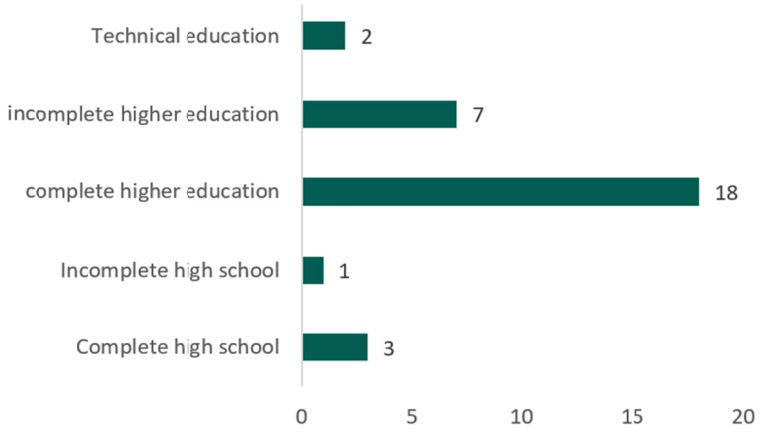

Figure 3. Education of consumers

Source: Prepared by the authors.

The age range of the 31 respondents who own electric bikes is diversified, as shown in Figure 4, with 58% divided between the age group of 27 to 38 years and 39 to 50 years.

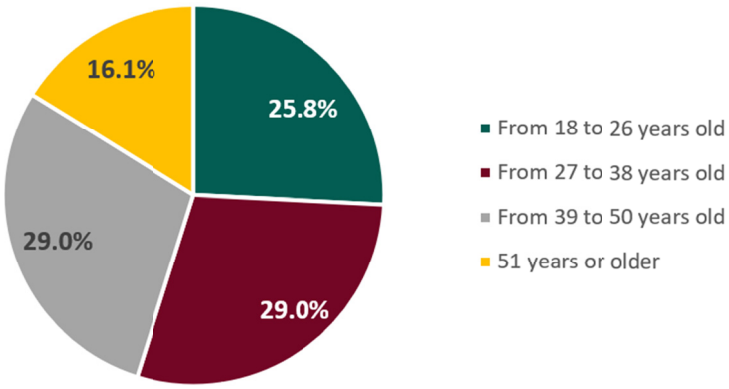

Figure 4. Age group of consumers of electric bicycles

Source: Prepared by the authors.

On consumer purchasing power, it is observed, according to Figure 5, that income is an influential factor in the consumption of this good since, among 31 consumers, 20 have income above three minimum wages, representing 64.5% of the sample.

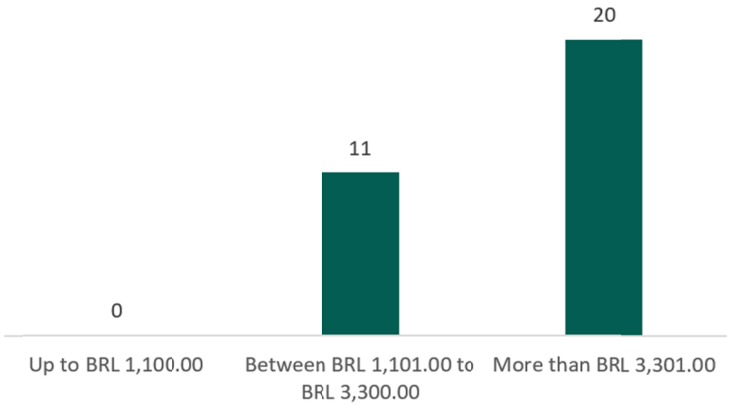

Figure 5. Electric bicycle consumer income

Source: Prepared by the authors.

Still, in the scenario of consumers of electric bicycles, they were asked about their knowledge of the term reverse logistics. Table 3 shows that 58.1% of consumers do not know the term. The result was no different than expected as the term is known to be specific, and the subject is relatively new in social discussions.

Table 3. Knowledge of reverse logistics

Are you familiar with the term "reverse logistics"?		
Yes	13	41.9%
No	18	58.1%

Source: Prepared by the authors.

Among the 38.7% who already needed to discard the battery, 45.4% discarded household waste, environmentally incorrect disposal, as illustrated in Figure 6.

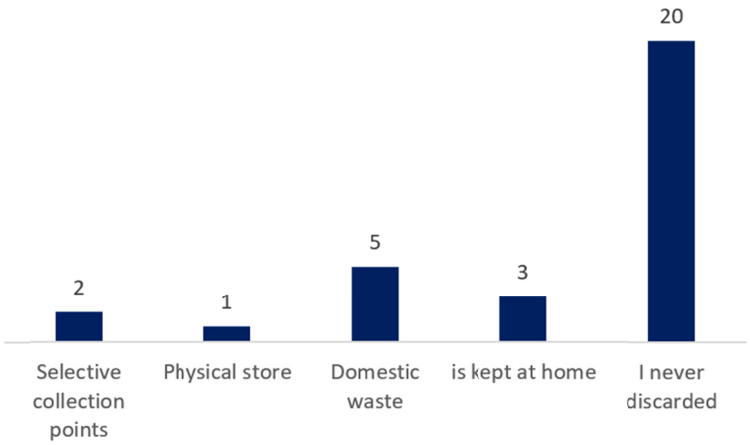

Figure 6. Disposal forms used

Source: Prepared by the authors.

Figure 7 shows that 13 individuals within the sample sought information on how to perform the disposal. The most effective form of the search was a website with 61.5% of the sample, followed by technical assistance with 38.4% and SCS (Customer Service) with 23%.

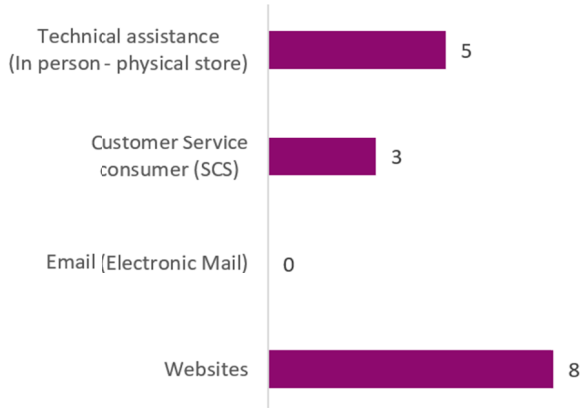

Figure 7. Means of information search

Source: Prepared by the authors.

Table 4 shows that although 54.8% know the consequences for health and the environment, a considerable portion, 45.2%, does not know.

Table 4. Knowledge of the consequences

Do you know about the harmful consequences to the environment, the incorrect disposal of electric batteries?		
Yes	17	54.8%
No	14	45.2%

Source: Prepared by the authors.

On legislation, 83.9% are unaware; see Figure 8. This fact should be circumvented through the dissemination of information.

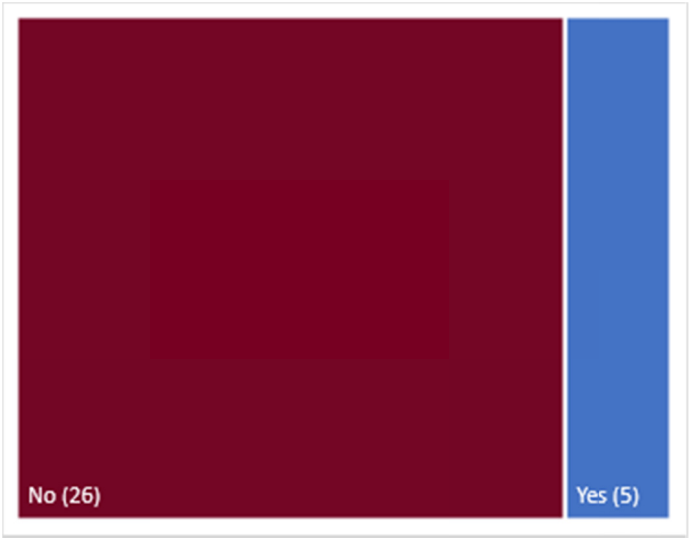

Figure 8. Knowledge of legislation

Source: Prepared by the authors.

In Figure 9, 58.1% of consumers claimed to be a decisive factor for buying; the company worried about the disposal of the product after consumption.

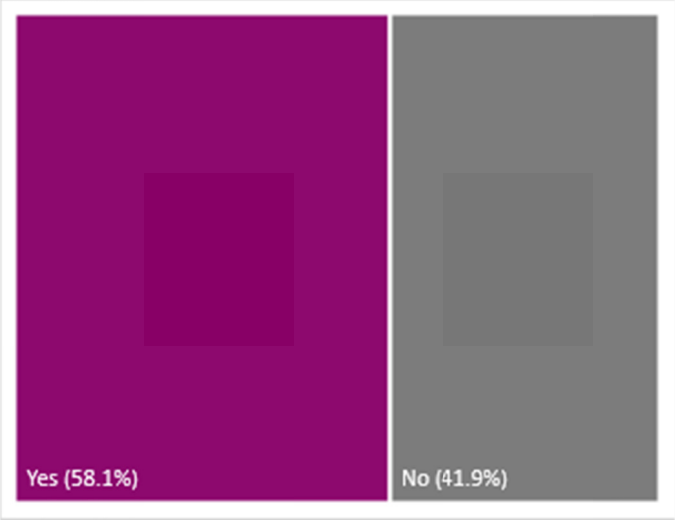

Figure 9. Consideration of decisive factor (consumers)

Source: Prepared by the authors.

In this survey, the potential market is equivalent to 45.4% of the total sample of 238 respondents, according to Figure 10.

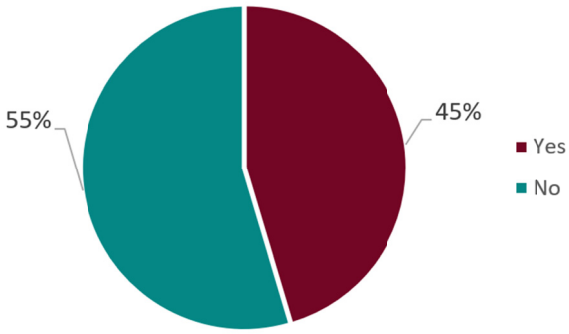

Figure 10. Intention to buy

Source: Prepared by the authors.

Table 5 shows that 71.3% consider a decisive factor, proving that the company is in accordance with the legislation and can attract new consumers, being a differential in the market.

Table 5. Influence of corporate behavior

Is it a decisive factor for your purchase to know that the manufacturer cares about the correct disposal of your product after consumption?		
Yes	67	71.3%
No	27	28.7%

Source: Prepared by the authors.

5. Conclusion

This paper analyzed the communication of reverse logistics programs of Brazil's chosen electric bicycle manufacturers. The survey was done through the messages disseminated by the company's channels and the consumer perspective, in addition to studying a possible competitive advantage.

Based on the survey data, the website is the most sought-after channel by consumers to obtain information, although none of the websites presented reports from existing reverse logistics programs. It was clearly and easily accessible; it was not informed about the disposal or recycling of batteries. Communication management does not occur efficiently, and the results prove that most did in household waste among consumers who have already discarded their batteries.

On the stakeholders, it was noticed that the officials and authorized distributors did not receive training adapted to go over again the necessary information to the consumers and to the one who has the intention of purchase, demonstrating that the communication must go beside the consumers since they all are affected by the lack of knowledge of the information of the internal clients. The latter should contribute to the effectiveness of Integrated Marketing Communication.

The non-existence of reverse logistics programs in manufacturing companies can be circumvented by hiring outsourced companies that can perform the adequacy of the contractor legislation. However, it does not absolve the responsibility of the company to train its employees responsible for the service channels so that more efficient communication management occurs.

The majority of consumers, 58.1% of the sample, and possible buyers, 71.3%, consider a decisive factor in their purchase to know that manufacturers companies care about the correct disposal of their product after consumption.

There is no unified message, facilitating consumers' understanding and awareness and not allowing new buyers to be attracted to competitive advantage. In this way, it is found that the chosen manufacturers do not operate their communication channels efficiently and are not in accordance with the current legislation.

Marketing, by integrating with sustainability, offers something beyond the construction of a responsible image for society. This provides information to the consumer and on the subject of reverse logistics is an effective means of environmental awareness, stimulating sustainable actions.

Future research should consider the integration of communication with monetary incentives. Individuals respond positively to a stimulus for their behavior change when considering their costs low. This is probably the case with the return of after-consumption batteries by the consumer. Thus, a communication that informs how it can forward its post-consumer waste and values its participation in assisting the reduction of socio-environmental damage, together with some economic incentives, would increase the return of electric batteries, also make faithful the consumer in a purchase situation of a new battery or bike.

References

ABNT (ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS). (2004). *NBR 10004: Resíduos Solidos* (p. 71). Classificação. Rio de Janeiro.

Acosta, B., Wegner, D., & Padula, A. (2008). *Logística reversa como mecanismo para redução do impacto ambiental originado pelo lixo informático*. https://doi.org/10.5329/RECADM.20080701002

Alianca, B. (2021). Mercado de bicicletas elétricas 2021. Boletim técnico. Retrieved September 17, 2021, from https://aliancabike.org.br/boletim-bikes-eletricas/

Alkahtani, M., Ziout, A., Salah, B., Alatefi, M., Abd Elgawad, A. E. E., … Syarif, U. (2021). An Insight into Reverse Logistics with a Focus on Collection Systems. *Sustainability*, *13*, 548. https://doi.org/10.3390/su13020548

Bernyte, S. (2018). Sustainability marketing communications based on consumer values and principles. *Regional Formation and Development Studies*, *3*, 26–35. https://doi.org/10.15181/rfds.v26i3.1807

BLITZ. (2021). Retrieved October 16, 2021, from https://www.blitz.com.br/

Cardoso, J. P. (2018). *Avaliação do impacto socioambiental da adoção do carro elétrico no Brasil* (p. 78). Trabalho de Conclusão de Curso, Universidade Federal de Santa Catarina, Araranguá.

Demajorovic, J., Augusto, E., & Souza, M. (2016). Reverse logistics of e-waste in developing countries: Challenges and prospects for the brazilian model. *Ambiente & Sociedade*, *19*, 117–136. https://doi.org/10.1590/1809-4422ASOC141545V1922016

Demajouovic, J. et al. (2012). Logística reversa: como as empresas comunicam o descarte de baterias e celulares? *Revista de Administração de Empresas*, 165–178. https://doi.org/10.1590/S0034-75902012000200004

Fernandes, S. et al. (2021). Revisão sistemática da literatura sobre as formas de mensuração do desempenho da logística reversa. https://doi.org/10.1590/0104-530x3177-16

FIEP (Federação das Indústrias do Estado do Paraná). (2013). *Logistica Reversa*. Guia Rápido. Retrieved October 1, 2021, from https://www.fiepr.org.br/logisticareversa/uploadAddress/LR.Guia_Rapido[59881].pdf

Kliatchko, J. (2008). Revisiting the IMC construct: A revised definition and four pillars. *International Journal of Advertising*, 133–160. https://doi.org/10.1080/02650487.2008.11073043

Kotler, P., & Keller, K. L. (2013). *Administração de marketing* (pp. 511–532). São Paulo: Pearson.

Leite, P. R. (2002). *Logística Reversa: Nova área da logística empresarial*. São Paulo: Columbia Sistemas Integrados de Logística.

Leite, P. R. (2017). *Logística Reversa: Sustentabilidade e Competitividade* (1st ed.). São Paulo: Saraiva.

LEV BICICLETAS. (2021). Retrieved October 16, 2021, from https://www.golev.com.br/

Lopes, V., & Pacagnan, M. (2014). Marketing verde e práticas socioambientais nas indústrias do Paraná. *Revista de Administração*, *49*, 116–128. https://doi.org/10.5700/rausp1135

Mattos, P. G. B. et al. (2020). Sustentabilidade: logística reversa e responsabilidade dos detritos de consumo (pp. 385–401). Anais do VIII Simpósio de Engenharia de Produção. Rio de Janeiro. https://doi.org/10.5151/viisimep-239385

Mendes, M. (2009). Perfil econômico do lítio nos países sul-americanos e consumo mundial. UNESP. Retrieved October 22, 2021, from https://repositorio.unesp.br/handle/11449/119955

MMA (Ministério do Meio Ambiente). (2016). *Logística Reversa*. Retrieved November 3, 2021, from http://www.mma.gov.br/cidades-sustentaveis/residuos-perigosos/logistica-reversa

Moraes, D., Rocha, T., & Ewald, M. (2014). *Life cycle assessment of cell phones in Brazil based on two reverse logistics scenarios*. https://doi.org/10.1590/S0103-65132014005000011

Nikolaou, I. et al. (2013). A reverse logistics social responsibility evaluation framework based on the triple bottom line approach. *Journal of Cleaner Production*, 173–184. https://doi.org/10.1016/j.jclepro.2011.12.009

RIO SOUTH. (2021). Retrieved October 16, 2021, from http://www.riosouth.com.br/

SOUSA MOTOS. (2021). Retrieved October 16, 2021, from https://www.sousamotos.com.br/

Stock, J., & Mulki, J. (2009). Product returns processing: an examination of practices of manufacturers, wholesalers, distributors and retailers. *Journal of Business Logistics*, *30*(1), 33–62. https://doi.org/10.1002/j.2158-1592.2009.tb00098.x

Villaverde, L. (2019). *O que é comunicação intergrada de marketing e porque é importante*. Retrieved November 22, 2021, from https://tutano.trampos.co/20592-importancia-comunicacao-integrada-de-marketing/