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Consumers Disposition to Pay: A Projection of Investments in Automobile Eco-Services

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Abstract

The research aims to analyze the willingness to pay and the projection of investments in ecological automobile services. The research presents a qualitative and quantitative approach and exploratory character, using bibliographical sources and semi-structured interviews in a first development and, later, statistical analysis of correlation between variables raised through the application of questionnaires via Google Docs to a sample of 384 individuals. As results, the necessities o0066 adaptation in the waste management were verified, as well as the correlation between the variables observable by the potential consumer and their willingness to pay more for these services, providing feasibility to the project.

Keywords: Services; Sustainability; Viability.

Introduction

The organizations are directly involved in the sustainable development movement, and their actions seek to be related to the respective strategies that govern the socioeconomic behavior of these companies, in this way, the need is to become social agents effectively representative in the pursuit of sustainability. (MUNCK; SOUZA, 2009).

Emerging from this need, there is the management of waste generated by companies that provide services and whose potential aggressor of the environment becomes harmful, and therefore must be managed in order to avoid or to minimize possible damages.

Among the changes in the state of the waste, the solids are highlighted for the high volume generated in diverse activities, thus receiving specific management treatments contemplated from 2010 when in the approval of the PNRS – Política Nacional de Resíduos Sólidos, which covers the entire life cycle of these products (DEMAJOROVIC; MIGLIANO, 2013). Solid waste is all the objects, materials, substances or goods that come from human activity and that present financial return due to its possibility of reutilization when under correct management (LIMA, 2012).

Among the various modalities whose management of solid waste is relevant, automobile service providers are a niche of companies whose production of this kind of waste that is harmful to the environment occurs at a particularly high level. This study focuses on this business modality, specifically on a provider of automotive electrical services. In business for more than 20 years, the company operates in Cascavel-Paraná in an area of 182 m^2, counting on five employees in the direct employment of labor, in addition to the owner, responsible for the administration.

Prior to the completion of the work, the company did not have a complete solid waste management, as well as the storage processes - unique in the management process - did not comply with all the requirements of the relevant legislation, being incompatible with the volume of waste generated by the company. In view of the identified management problems, the study sought to answer: What is the consumers willingness to pay more for environmentally friendly automobile services? And from this research question, the article assumes the objective of analyzing the willingness to pay and the projection of the investments in ecological automobile services.

After the introduction, the theoretical reference of the present research is presented, in order to present the theoretical point of view for the elaboration of the present study. The third section contains the methodological procedures, and the fourth, the results obtained and the respective analyzes carried out. The work is finished with the conclusions, followed by the references used to carry out this research.

Theoretical Framework

In this topic of the work, the theoretical concepts that support its development are developed, dealing with the respective sustainability issues in the organizations and the solid waste treatment as an efficient measure for the follow up of the automotive service providers to fit this need.

Sustainability and Environmental Management

The market adaptation, instigated by the competitive increase, promotes greater approximation to the tendencies and preferences of consumption of the population. Since the twentieth century, however, a significant concern arises with the environmental scenario that is exposed and, soon, with its future destruction that will affect the whole society in the long term. Given this, it is remarkable the maturation of sustainable consumption ideals, demanding services and products environmentally correct, which minimize the impacts of a system in adaptation (SOUZA, 2013; TOPPE, BRANDALISE, ROJO, BERTOLINI, 2015).

At the heart of this change are companies in general that use or interact with the environment through the development of their activities, adopting a contribution to the degradation of the environment. Being these companies surrounded by a sustainable ideal, the market tends to demand balance between the economic, social and environmental pillars, so as to allow the continuity of the organizations present in it (PIMENTA; GOUVINHAS, 2011).

According to Ribeiro, Carlesso e Ribeiro (2013), environmental management can occur at all levels of companies, and it can be found mainly in corrective actions to recycle products, investments in the correct storage of waste, reduction of water and electricity comsumption. However, the authors argue that for organizations to achieve adequate development in environmental management, they should replace corrective actions with those that allow anticipation of possible problems or that generate competitive advantages, denominating them preventive measures.

However, the adaptation of these companies to environmental policies that minimize such impacts barriers finds in their managers' reluctance, which prevent their occurrence, mainly due to the difficulty in measuring financial returns from these policies, considering the amounts committed as costs and not as investments (LIMA; BERTOLINI; RIBEIRO, 2014).

However, Souza (2013) affirms that there are not only barriers to the adoption of green policies by companies, but also motivational aspects that lead to organizational adaptation. In this regard, Lima, Bertolini and Ribeiro (2014) define as motivators a sense of ecological responsibility, adaptation to legal issues, management of an organization's image towards a conscious market, and the possibility of creating competitive advantage and thus greater profits from the provision of an ecologically correct service, making the application of environmental protection processes in organizations feasible.

Automotive Service Providers and Solid Waste Management

Among the components that generate environmental impacts and which need proper management, there is the solid waste, which according to Souza (2013) are composed of products derived from productive sources that, formerly called trash, assume such nomenclature due to the existence of commercial value for its reuse, given that, for the author, these wastes are considered to be responsible for the environmental degradation that society faces and, according to Guardabassio and Pereira (2015), are characterized as one of the greatest problems of the present time.

In this way, the generation of solid wastes and effluents by some commercial modalities have been widely discussed by responsible entities, such as the National

Environmental Council (CONAMA), in order to mainly regulate the correct allocation of these, since in most cases they are discarded in inappropriate places, thus coming into contact with the environment and causing its wear (INEA, 2014).

In this way, automotive service providers become objects of attention because of the large volume of solid waste and effluents generated in the development of their automotive maintenance activities, due to the expansion of such market in recent decades driven by the relative increase in the Brazilian fleet of vehicles, which consequently impacts on the increase of the demand for these services and on the substantial increase of the generated residues, such as used lubricating oil, lamps, used batteries, as well as tows and flannels contaminated with lubricating oil (LUCENA; MELQUÍADES, 2012).

The solid wastes generated by companies of the genre are classified by the NBR 10004 standard of the Brazilian Association of Technical Standards - ABNT (2004), which includes solid and semi-solid state residues derived from man's different activities and which have a high polluting potential in contact with the soil, aquifers and sewage, when there is no previous treatment and conversion of its harmful agents, as well as its correct handling, storage, transportation and final disposal (LUCENA; MELQUÍADES, 2012; GERHARDT et al., 2014).

So, there is a classification of these wastes according to their components and characteristics into two groups, being Class I - Hazardous Waste, which are all the residues whose properties present risks to public health and / or damage to the environment, and those included in Class II - Non-Hazardous, being divided according to their specifications in Class II-A (Non-inert), these being the residues that do not fit into Class I, and Class II-B whose components are diluted in contact with water; and Class II-B (Inert), which have characteristics listed in NBR 10006 and 10007 of ABNT, where analyzed in their technical specifications do not present damage to the environment or change in water potability (GERHARDT et al., 2014).

In dealing with the proper Environmental Management of these establishments, there are no regulations that express the certification of this modality, which may limit the availability of consumers to pay more for a "green" service, while there is no easy identification of such processes (GERHARDT Et al., 2014). However, for the purpose of inspection, there are guidelines that include the specificities of the proper collection and storage of the previously mentioned residues according to their hazardous classification, which must be met by them, at the cost of severe penalties (LUCENA; MELQUÍADES, 2012).

In this sense, used or contaminated lubricating oils (UCLO), as well as tows and flannels contaminated with it, are classified due to the high toxicity of their carcinogenic components as hazardous waste, being the object of a series of regulations that treat from their correct storage - that must be made in weatherproof and covered containers, having containment structures to avoid contamination of other wastes, passing through its transport to its re-refining, which is its final destination, since such waste cannot be burned or released to the sewage system (SILVA et al., 2014).

Equally subject to regulations and also classified in Class I, the automotive batteries already used have in their composition various acids and heavy metals, such as mercury, which are highly dangerous to human health. For this type of material, reverse logistics should be applied according to Conama resolution No. 257 of June 30,

1999 (MINISTÉRIO DO MEIO AMBIENTE, 2015) and must be stored in places protected from the elements (RIBEIRO; CARLESSO; RIBEIRO, 2013; SOUZA, 2013).

Another residue generated in large quantity by automobile electric service providers are the bulbs coming from the substitutions. This residue has several types of components that can be separately reused, such as glass, metal and phosphorus, provided that they are decontaminated by leaching, stabilization and incineration, eliminating the various heavy metals that compose these materials, such as mercury (LIMA, 2012).

The other wastes - plastics, cardboard, metals, office supplies and refectory - provided that they do not come into contact with waste contaminated with oil, must be properly separated and sent to recycling, being stored in dry and covered places. According to CONAMA 275, this segregation must take place through color-differentiated containers in order to facilitate the identification of the correct deposit location (GERHARDT et al., 2014).

In addition to these solid waste management processes and the correct destination, mechanical workshops should use a series of precautions during the development of their activities, including care with their structure, as well as with employees who may be exposed to risks if they come into contact with dangerous agents, such as lubricating oil (NUNES; BARBOSA, 2012).

In structural terms, companies whose activities generate residues derived from petroleum, such as solvents and lubricating oils in general, must carry out structural adaptations, according to Conama resolution Nº. 362, of June 23, 2005, to avoid the possible contact of these agents with the soil, since they have great pollution potential. In the municipality of the company under study, Cascavel-PR, decree Nº 11,966 of september 5, 2014 regulates Law Nº. 3305/2001, which establishes environmental licensing within the municipality.

Environmental issues should then be seen as an alternative of competitive advantage through the possibility of generating value and strengthening the image towards its public, both internal and external.

Methodology

The research was carried out in two stages, the first of qualitative and exploratory character since according to Fleming et al. (2005) this represents the first contact of the researcher with something new and allows to verify the confirmation or not of the sources of the problem, as well as to indicate new sources for the same.

This stage was developed through a semi-structured interview with the entrepreneur in order to gather information about the problems faced by the company under study regarding the management of generated waste. Qualitative interviews are slightly structured and in this sense, the main interest of the researcher is to know the meaning that the interviewee gives to the phenomena and events of everyday life (MARCONI; LAKATOS, 2011).

The non-participant observation was also carried out in the first stage through in loco visits, identifying variables not mentioned by the company owner. Observation is a fundamental element for research either in the formulation of the problem, in the construction of hypotheses, in the collection, in the analysis or in the interpretation of the data. In the phase of data collection its relevance becomes more evident, since the ob-

servation is always used in this stage, and it can be used in conjunction with other techniques or exclusively (MARCONI; LAKATOS, 2011).

After the data were collected, the problems identified were related for the development of the diagnosis of the investment needs in the organization, to solve the adversities encountered.

The second stage of this work is formalized by quantitative exploratory method, aiming to evaluate, from the costs exposed in the suggestions of adequacy of the treated organization, and the evaluations of motor vehicle owners on the environmental perceptions when hiring a service, verifying the possibility of them to give preference to consumption by "green companies", as well as to raise their pre-disposition to pay more for these services according to stages of the model proposed by Bertolini (2009), making it possible to evaluate the economic viability of the proposed changes.

In this way, statistical hypotheses are formulated on this second stage of the research thus presented:

H0: Customers are not willing to pay more for green services, making them financially unfeasible.

H1: Customers are willing to pay more for green services, making them financially viable.

The data collection form – DCF, composed of ten questions, was used to collect socioeconomic data of users, the perception about some environmental measures that can be employed in the company regarded (according to the first stage of this work), their disposition to give preference to choose a service provider that adds such actions as well as the possibility of paying an additional percentage for these services. The DCF was implemented through the Google Docs tool, so that 384 people responded by having as a common characteristic among the participants owning a vehicle and thus being potential consumers of company services.

The sample was calculated by Equation 1, presented below, for infinite samples according to Costa Neto (2002), since the population standard deviation is unknown. The calculation resulted in a required sample of 384 individuals. We considered, in the calculation, error equal to 5% of significance and degree of confidence of 95% (Zα = 1,96).

$$n = \left(\frac{Z\alpha}{\epsilon o}\right)^2 * 0{,}25 \qquad (1)$$

Data were analyzed applying one-dimensional statistical methods using Excel software Excel (2010) which, according to Rodrigues (2010), generate information and graphs on a single variable, as well as two-dimensional data that, according to the author, allow us to analyze more than one variable together, also performed in Excel (2010).

It was also done, from dynamic tables and through the supplement Action available in Excel, statistical tests, thus if the p-value of independence test was ≤ 5% (α %), there is significant relation between the variables; otherwise, there isn't. (LARSON; FARBER, 2004).

Results and discussion

In this part of the work the data analysis was performed being divided into three stages, the first demonstrating the result of the diagnosis of the automotive electrical services provider, the second presenting the quantitative analysis related to the DCF applied, the third one constitutes the feasibility study that followed steps of Bertolini model (2009).

Analysis of the Diagnostic Process

The organization under study, located in Cascavel - PR, operates in a region of the city characterized as valley bottom. The bottom regions of the valley are characterized by being the lowest points of a rugged relief, where the rainwater flows (RICCIARDI et al., 2013).

In its 182 m^2 structure, the company counts on the services of five collaborators besides the owner, who carry out maintenance of up to five cars simultaneously, having an average volume of twenty-five services per day, corresponding to an average of 650 services per month.

Its location as well as the volume of solid waste generated are factors that make the workshop automatically subject to municipal inspections, whose objective is the protection of the environmental resources available in the region (forest, springs and water sources) and also the correct disposal of waste.

Generator of various types of solid waste from the maintenance activities of every electric system boarded in a car, described in Frame 01, the owner seeks to adjust its structure in order to minimize possible future risks and also to a previous organization in case of emergence of pertinent regulations to a possible environmental certification of the modality.

MAIN ITEMS TREATED BY MECHANICS IN STUDY	
Electronic injection	Electrical system
Alternator	Start engine
Lamps (signage / lighting)	Air conditioning

Frame 01 – Main services provided by the company under study

Solid waste generated through these activities, to be managed in a manner consistent with the pertinent legislation, needs to be classified according to the risk offered by its specifications, according to the regulations in NBR 10004, previously described.

These standards include the waste generated by the maintenance activities described in Frame 1, allowing them to be classified according to their hazardousness to the environment and to the human being. In this study carried out in loco, it was verified which are these residues and in what situation their management process is, seeking, from this analysis, to propose interventions in the processes practiced by the company. Frame 02 shows what these wastes are, as well as their respective classification, the storage that is made in the organization, and the destination given to these wastes by the company.

SOURCE	TYPE OF RESIDUE	CLASS NBR 10.004, 2004	STOWAGE	DESTINATION
Maintenance	Wires	Class II-B Inertes	Plastic Gallons / Courtyard	Reuse
Substitution	Lamps	Class I hazardous	Plastic Gallons / Courtyard	No destination
Substitution	Batteries	Class I hazardous	Without Stow-age	Reverse Logis-tics
Substitution	Alternators	Class II-B Inertes	Plastic Gallons / Courtyard	No destination
Cleaning and Maintenance	Contaminated flannels	Class I hazardous	Plastic Gallons / Courtyard	No destination
Substitution	Various metal parts	Class II-B Inertes	Deposit	Reuse or sale
Packing of parts	Paper / Plastic	Class II-A Non-Inertes	Plastic Buckets	Public Collect
Maintenance	Packaging (sol-vents and lubri-cants)	Class I Hazardous	Plastic Gallons / Courtyard	No destination
Maintenance Own vehicle	Oil	Class I Hazardous	Specific Gallon	Transfer to neighboring mechanics for disposal
Substitution	Electric Glass Machines	Class II-B Inertes	Deposit	Reuse or sale

Frame 2 - Classification of waste generated by the company under study

The construction of Frame 2 seeks to simplify the visualization of the processes maintained by the company at the moment of the evaluation carried out. It is important to note that most of the waste generated was not segregated according to its specifications, being disposed in common gallons and without separation of the residues, allocated in an open area without any protection, which can alter their specifications, rendering them unusable.

Among the residues generated by the company, it is especially noted that those belonging to Class I, which are hazardous, and which present a greater risk to both public health and the environment, neither had correct storage, nor received the appropriate destinations through specialized companies, capable of reusing the materials in order to avoid their deposit in landfills or "dumps".

Among the wastes classified as hazardous, those that have been in contact with used or contaminated lubricating oil (UCLO) and even the oil itself, extracted from vehicles used by the owner, have great harmful and polluting potential to the environment. When they come into contact with soil or water, they dissipate quickly, reaching river networks and sewage system, compromising the treatment of these networks due to the high cost of the operation (SILVA et al., 2014).

It was noticed that, in the company under study, the correct management of this waste did not occur, since elements contaminated with oil and solvents were segregated along with other reusable residues, contaminating them in the same way, making it unfeasible to reuse. It was also observed that, up to the time of the investigation, there were no containment barriers that avoided the dispersion of contaminated waste (SILVA et al., 2014).

Another waste classified as dangerous and which was not contemplated in an efficient management by the company was the used lamps, classified in this way, according to Lima (2012), due to the mercury and other heavy metals present in its composition. Despite the degree of hazardousness of this residue, there are present components that can be reused, once decontaminated.

Still in relation to residues considered hazardous, the used automotive batteries that present diverse acids and heavy metals harmful to the human health in their composition did not present correct handling and deposit, since they are stored directly to the floor, without any protection. Despite the critical situation of storage, its destination is practiced according to CONAMA Resolution Nº 257 of June 30, 1999, which requires the execution of reverse logistics by the manufacturer (SOUZA, 2013).

The other wastes, classified as non-hazardous, also presented shortcomings regarding their storage and the final destination given by the company. This is mainly done by the fact that these materials are allocated together with the waste contaminated with oil, making them equally dangerous. The storage of these, as well as some of the other class - contaminated flannels and tows, contaminated oil and solvents containers - was made in ordinary gallons, without any segregation, and unprotected from weather.

Due to the exposure of these inert or non-inert waste to other contaminated ones, the final disposal of the wastes, which happens in a simplified way through the common collection and sale of these wastes, happens to be occurring incorrectly since these residues are also contaminated from contact (GERHARDT et al., 2014).

According to Conama 275 regulations, it is necessary the disposition of color-differentiated dumps that facilitate the correct segregation of waste produced - metals, paper and cardboard, plastics, wood and glass. It was noted that the organization also lacked such equipment, which would facilitate segregation at the site (GERHARDT et al., 2014).

Regarding the final destination given to the various wastes of the company, in addition to those already in place - reverse logistics, common collection and junkyard - at the time of the study, the company did not have a contract with a specialized company capable of issuing reports of collection of this waste in order to generate documentation that proves the correct destination, especially of the waste classified as hazardous.

In addition to the regulations that covers the handling of waste within the company - packaging, final destination - current legislation also covers the structural issues of organizations, which should converge to complete waste management, as well as the sustainability of the company (RIBEIRO; CARLESSO; RIBEIRO, 2013).

In structural terms, companies whose activities generate residues derived from oil (OLUC) must carry out structural adaptations according to Conama Resolution Nº 362, from June 23, 2005, which determines the need of waterproofing the floor, where the treatments of the vehicles occur. It was observed that the company analyzed already had structural adaptation in concrete, impermeable, which is already sufficient to comply with the normative.

Another positive factor evaluated during the process was the presence of translucent tiles that allow the entrance of natural light and, consequently, minimize the need for the use of light bulbs. This factor is important because it links two pillars of

sustainability, environmental preservation and the financial economy generated by the lower consumption of electricity.

In general terms, and in accordance with environmental regulations, the management of waste generated in the electric automotive service provider did not fully comply with legal requirements, presenting problems at various levels of the process.

Analyzing the points raised by the research as being of importance for full environmental management of the company, starting from actions that mainly contemplate the processes involved in solid waste management, an environmental action plan was developed for the organization under study.

Frame 3 summarizes the problem situations encountered, the possible solutions to these problems, the estimated cost of these adaptations and the expected time to execute them, aiming to provide complete guidelines for the entrepreneur, for the adequacy of legislation, and adaptation for future environmental certifications.

It's crucial to observe that the budgets made are estimates of costs for the implementation of such interventions. The budgets were requested via telephone contact and e-mail, and there was no on-site visit by the providers of the suggested services up to the time of writing this study.

Problem situation	Solution	Cost	Time to run
Batteries kept in the yard, without cover or raised platform (direct contact with the ground).	Allocate the batteries in an area already built in the company. Adjust product stock (organization) to allocate batteries.	Non	Weekend (Ideal to execute the action with the company closed)
Contaminated waste (oil containers, flannels, plastics). Collection of oil (made so far by neighboring company). Lack of proof of proper collection. Lamps without proper destination.	Separate properly, in addition to providing the proper destination and collection through specialized company.	Contaminated waste collection service: average of R $ 100.00 / month, including drums for the storage of waste.	Immediate negotiation with the company. Deadline for the availability of drums for the disposal of waste and for the collection to be negotiated with the company.
Oil stains on the floor.	Provide renewal of floor paint with waterproof Epoxy paint to improve the image for customers.	Renovation of the painting: 12 Gallons of 3.6 L: R$ 2,438.40 Labor: R$ 11,00 / m^2	Weekend (Ideal to execute the action with the company closed)
Non-contaminating solid wastes separete in unsuitable containers.	Replace improvised waste bins with specific waste bins for selective waste collection, increasing the efficiency of disposal by employees and customers.	Set with 4 bins for selective collection with capacity of 60 liters each, with adhesive R$ 416,00 x 2 = R$ 832,00	10 working days (delivery period).
TOTAL INVESTMENTS AND TERM		R$ 2.832,00	10 days

Frame 03 – Environmental Action Plan

The suggested interventions are aimed at solving problems related to the environmental issue, but, if implemented, can also result in the improvement of the environment of the company, both for employees and customers.

Quantitative analysis of the data obtained by the CFD

When questioned about whether or not it is important for companies to correctly dispose of waste, 99% (Fig. 1) of the respondents affirm that this environmental care variable is important, and only 1% do not consider this environmental characteristic at the time of purchasing the service.

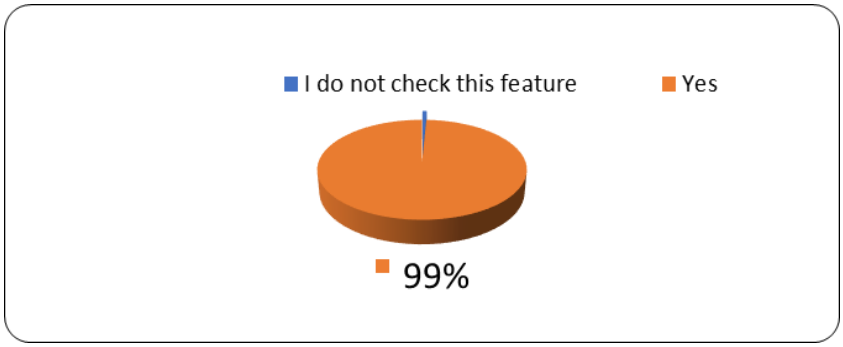

Figure 01 – Perception about the correct destination of waste.

As for the question about taking into account the energy and water expenditure generated by the product to be acquired, a greater balance was obtained in the answers, indicating that most of the interviewees - 54% adding those that do not take into account and those that say they do not check the issue of water and light expenses generated to produce the product or service. The other part - 46% of respondents said they take this variable into account.

Regarding the issue that deals with the environmental perception of the interviewees, it sought to evaluate the importance given by them in relation to the waterproofing of the floor in companies that generate effluents like contaminated oil for example. A total of 92% of those surveyed consider this action to be important in companies that generate effluents (Figure 02), a result similar to that shown in Figure 01, demonstrating that they are two factors that have a great impact on the environmental perception of potential consumers of an autoeletric.

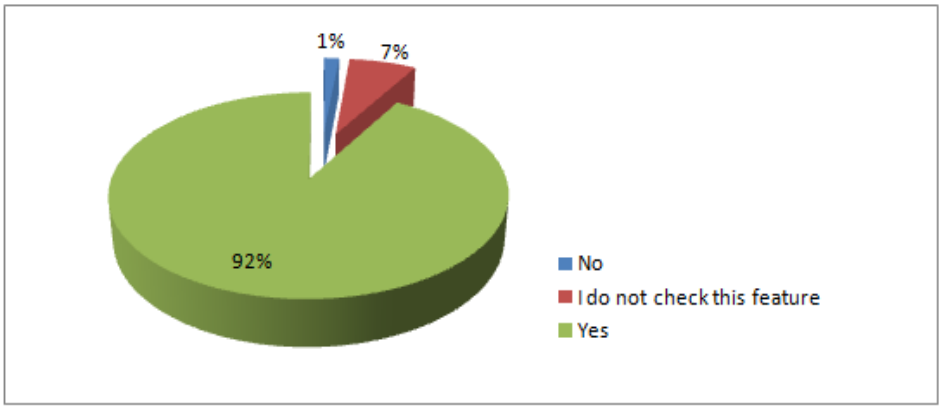

Figure 02 – Importance given to waterproofing the floor.

From these three questions, it can be stated that soil sealing and waste management in a company with these characteristics have a greater perceptive impact on the potential customers of auto electric workshops. Below, it will be presented the data related to the two-dimensional analyzes where questions about socioeconomic data of the respondents were related to the question that sought to identify if they are willing to pay more for products or services that present environmentally correct characteristics, ranging from zero or no disposition to pay, up to more than 20% on the value of the service.

Another issue analyzed in a one-dimensional way was the willingness of respondents to pay more for environmentally correct services and the possible amount to be extra paid for them. According to the data presented in Figure 03, 26% of the respondents, which correspond to 91 people, would not pay more for environmentally correct services. However, the vast majority of people would pay a higher percentage for such services, 36% would spend up to 5% more, 28% would pay up to 10% more, 26 respondents (7%) would pay up to 15% more of the value, and 10 respondents indicated that they would pay 20% or more.

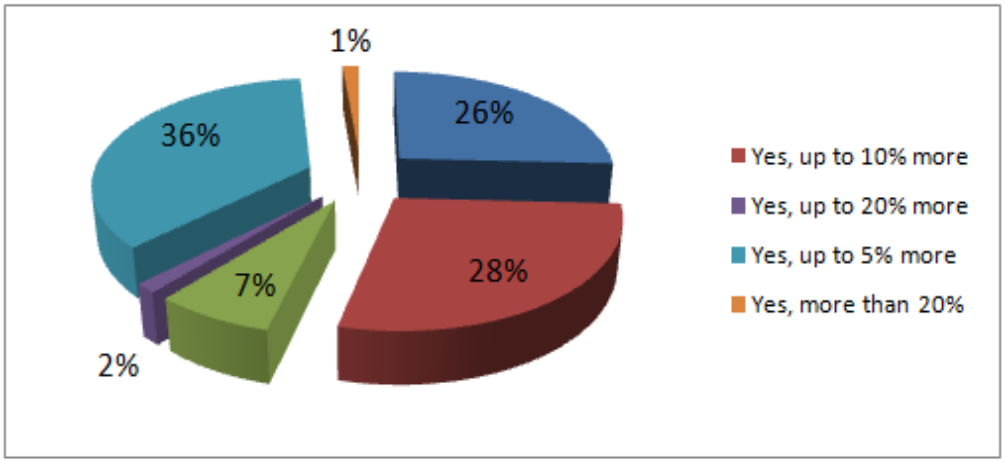

Figure 03 – Willingness to pay for environmentally correct service

Following the suggestions of actions and investments required for the environmental adaptation of the workshop studied, the analysis of the economic viability for the adaptation of the organization to the mentioned issues is presented in the sequence.

Financial feasibility analysis

In this stage, the financial return of the environmental adaptations of the studied organization is shown, according to some adapted steps of the model proposed by Bertolini (2009). The complete model proposed by the author can be represented in Figure 04.

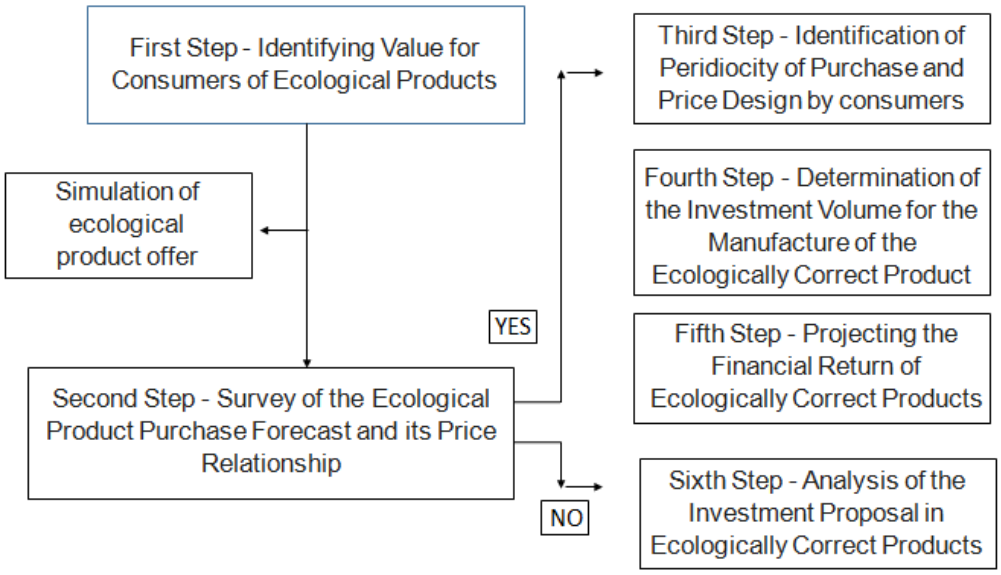

Figure 04 – Bertolini model flowchart
Fonte: Bertolini (2009).

In order to achieve this work's objective, which is to identify if it is feasible for the entrepreneur to make the environmental adaptations, in relation to the possibility of increasing the value of the services offered, proportionally to what was pointed out in the questionnaire, the Third, Fifth and Sixth Steps of the Model proposed by the author were applied.

The company regarded presents average daily attendance of 25 cars and an average return of R$ 115,00 per service, resulting in monthly gross sales of approximately R$ 69,000.00. For the calculation, the average rate of return of savings account is used, since the total value of the investment is low, making it impossible to apply low-risk applications with higher returns, and the annual rate of 6.5% is used in this calculation.

Step 3 of the Model

The willingness to pay was obtained through the survey conducted from which the results are shown in Frame 04.

If you answered YES in the previous question, would you pay more for the environmentally friendly service?	Nº of respondents
No	91
Yes, up to 5% more	127
Yes, up to 10% more	99
Yes, up to 15% more	26
Yes, up to 20% more	5
Yes, more than 20%	5
Did not answer	(27)
Grand total	353

Frame 04: Interviewees who would pay and how much they would pay extra for the service

For the calculation of the willingness to pay more for the service provided, the rate of 10% was used because it represents an average among the participants of the survey who answered 5%, 10% and 15% of increased amount.

Having an average turnover of R$ 69.0000, and considering that 91 respondents are not willing to pay any surplus, representing 25.78% of the total of 353 respondents of this question. Thus, 74.22% of the public shows a tendency to pay a 10% increase over the value of the service, resulting in an increase in monthly revenue of R$ 5.121,18.

Step 5 of the Model

The results obtained are shown next to Equation 02 elaborated by Bertolini (2009) as follows:

$$P.V.T.p.* \frac{1-(1+i)^{-n}}{i} = P.V.T.des. \quad (2)$$

Taking as the duration of the total investment estimated at R$ 2.832,00, 5 years, as well as the rate of return previously mentioned, we have:

5.121,18 x 1- (1+0,065)-5/ 0,065
5.121,18 x 4,155
P.V.T.des = R$ 21.278,50

Step 6 of the Model

Step 6 consists in the calculation of the Financial Return projected for each R$ invested, according to Equation 03 proposed by Bertolini (2009).

$$\frac{P.V.T.des.}{I.P.E.} = R.F.R\$\ in. \quad (3)$$

Where I.P.E is the investment necessary for the development of the ecological product, in this case the total amount of investment to be made by the company is R$ 2,832.00. And R.F.R $in, searched with this formula as final calculation step, concerns to the projected financial return for each invested R$, hence we have:

21.278,50/ 2832,0 = R.F.R$ in
= 7,51

This result represents that for each R $ 1.00 invested for the environmental adaptation, the company can achieve a return of up to R $ 7.51 from the changes made and the curtomers willingness to pay more. Thus, the sixth stage, which is consistent with the feasibility or not of the investment analysis, is based on the Viability Table proposed by Bertolini (2009), presented in Frame 05.

SITUATION OF THE FINANCIAL RETURN PROJECTED FOR EVERY R$ INVESTED	VIABILITY OF THE INVESTMENT
R.F.R$. in < 1	There is no financial viability in the investment
R.F.R$. in = 1	Break-even point of the investment
R.F.R$. in > 1	There is financial viability in the investment

Frame 05 - Feasibility Table
Fonte: Bertolini (2009).

Thus, it has been found that R.F.R. > 1, that is, the possible return is greater than 1, so there is financial feasibility of the investment for the environmental adaptation proposed by this work to the company studied.

Chi-square of the willingness to pay

Frame 6 shows the results of associations of socioeconomic data collected in the DCF - gender, age, income and schooling, with the variable that includes the willingness to pay some additional value for products or services that have an environmental appeal.

Association of the variables	p-value
Genre X Willingness to pay	5,95719E-05
Age X Willingness to pay	0,000888281
Income X Willingness to pay	3,13721E-09
scholarity X Willingness to pay	0,000210197

Frame 06 – Chi-square for socioeconomic variables and willingness to pay

The first result presented in Table 06 for the association between the variable Gender and Disposition to pay shows p-value <0.05, which allows us to affirm that there is a significant relationship between the gender of the sample and its willingness to pay more for environmentally correctly services.

The same significant relation was found when associating the variable Age with the Disposition to pay, where p-value = 0.0008, being then less than 5% and making it possible to infer the existence of a significant relationship between the two analyzed variables. The third relation exposed in Frame 06, on income and the willingness of the sample to pay more for services of companies that adhere to environmental actions, shows a p-value of less than 0.05, which allows to affirm that there is a significant relationship between these variables.

Another relation carried out in this study was the schooling of the sample in relation to its willingness to pay more, where the result presented in Table 06 shows the p value lower than 0.05, being 0.0002. This result allows to affirm that, such as the other results, this last analyzed association also presents significant relation between the variables. Therefore, it can be affirmed that all the associations made and presented in the results of Frame 06 have a significant relation with the willingness of the sample

to pay more for products or services of companies that present environmental actions in the development of their businesses.

Final considerations

By analyzing the organization's ecologically correct service delivery, it was possible to identify consumers' willingness to pay, but also to address several issues in the management of these solid wastes. The research enabled the indication of an action plan easy to apply, which allows a greater level of sustainability to the company, since it minimizes the risk of impact to the environment (pollution), allows the execution of services with fewer risks to society (contamination) through low cost actions, also avoiding future risks with fines and charges arising from some unmet legal requirement.

Therefore, it is possible to affirm that the objective proposed in the research was achieved. The statistical calculations allow to point out the rejection of the null hypothesis H0, since the results indicate that such actions present financial viability for their implementation, accepting the hypothesis H1: Clients are willing to pay more for ecological services, making them financially viable.

It is suggested, for future studies, the analysis of the economic viability of the implementation of environmental certification to the company and the identification of the values that customers are willing to pay for services provided by companies classified as environmentally correct, in order to verify the market advantages that certifications would bring to the organization under study. It is also suggested to carry out a new diagnosis of the company after the implementation of the suggested interventions, in order to confirm the effectiveness of these actions.

References

BERTOLINI, G. R. F. Modelo para a identificação do volume de investimentos na fabricação de produtos ecologicamente corretos. 2009. 161 f. **Tese** (Doutorado em Engenharia da Produção) – Programa de Pós-Graduação em Engenharia da Produção, Universidade Federal de Santa Catarina, Florianópolis, 2009.

COSTA NETO, P. L. O. **Estatística**, 2. ed. São Paulo: Edgar Blücher, 2002.

DEMAJOROVIC, J; MIGLIANO, J. E. B. Política nacional de resíduos sólidos e suas implicações na cadeia da logística reversa de microcomputadores no Brasil. **Gestão & Regionalidade,** São Caetano do Sul, v. 29, n. 87, p. 64-80, set./dez. 2013.

FLEMING, S. F; FLEMING, I; MESTRINER, D. L; OGURA, A. F; PALAGI, A. M. **Manual para elaboração de trabalhos científicos, redação oficial e comercial**. Cascavel: Coluna do Saber, 2005.

GERHARDT, A. E; DRUMM, F. C; GRASSI, P; FLORES, B. A; PASSINI, A. C; BORBA, W. F; KEMERICH, P. D. C. Diagnóstico para o gerenciamento dos resíduos sólidos em oficina mecânica: estudo de caso em concessionária do município de Frederico Westphalen – RS. **Revista Monografias Ambientais,** v. 14, n. 1, p. 2899-2908, 2014.

GUARDABASSIO, E. V; PEREIRA, R. da S. Gestão pública de resíduos sólidos urbanos na região do grande ABC. **Gestão & Regionalidade,** São Caetano do Sul, v.31, n. 93, p. 127-143, set./dez. 2015.

INEA – Instituto Estadual do Ambiente. **Oficinas mecânicas e lava a jato: orientações para o controle ambiental,** 2.ed. Rio de Janeiro, 2014.

LEIS MUNICIPAIS. (27 de maio de 2015). Fonte: http://leismunicipa.is/afjdu

LIMA, A; BERTOLINI, G.R.F; RIBEIRO, I. Avaliação da conduta de empresários da região Oeste do Paraná, Brasil, em relação aos investimentos para a preservação do Meio Ambiente. **Revista Eletrônica de Administração e Turismo**, V. 4 – número 2, p. 280 – 293, Janeiro-Junho/2014.

LIMA, R. F. T. de. **Sistema de Gestão Ambiental (SGA) em Atividade de Recuperação Veicular, Funilaria e Pintura:** Estudo de caso na *Lince All Service.* (Dissertação de Mestrado) Pontifícia Universidade Católica de Goiás, 2012.

LUCENA, K. F. M; MELQUÍADES, T. F. O comportamento ambiental de empresas do ramo de oficina mecânica: um estudo de caso em João Pessoa – PB. VII CONNEPI – Congresso Norte Nordeste de Pesquisa e Inovação, **Anais...** 2012.

MEDEIROS, M. B. Análise do grau de consciência ambiental dos gestores de oficinas mecânicas: o caso do Distrito Mecânico de João Pessoa-PB. **Revista Ambiental,** V.1, n. 1, p. 49 - 58, Jan/Mar, 2015.

MINISTÉRIO DO MEIO AMBIENTE. Resoluções. (15 de junho de 2015). Fonte: http://www.mma.gov.br/port/conama/

MUNCK, L; SOUZA, R. B. de. Responsabilidade social empresarial e sustentabilidade organizacional: a hierarquização de caminhos estratégicos para o desenvolvimento sustentável **REBRAE. Revista Brasileira de Estratégia**, Curitiba, v. 2, n. 2, p. 185-202, maio/ago. 2009.

NUNES, G. B; BARBOSA A. F. F. Gestão dos resíduos provenientes dos derivados de petróleo em oficinas mecânicas da cidade de Natal/RN. **ENECT – Encontro Nacional de Educação, Ciência e Tecnologia/UEPB,** 2012.

PIMENTA, H. C. D; GOUVINHAS, R. P. A produção mais limpa como ferramenta da sustentabilidade empresarial: um estudo no estado do Rio Grande do Norte. **Revista Produção,** IFRN, Natal – RN, Brasil, 2011.

PORTAL DO MUNICÍPIO DE CASCAVEL. (27 de maio de 2015). Fonte: http://www.cascavel.pr.gov.br/servicos/leis/consulta_titulo.php

RIBEIRO, G. F; CARLESSO, R. E. C; RIBEIRO, M. E. O. Conscientização ambiental na empresa Auto Elétrica GF, no município de Marcelância – MT. **REFAT- Revista eletrônica**, v.3, n.1, 2013.

SILVA, M. A; RIBEIRO, S. N; CRISPIM, D. L; SOBRINHO, L. G. A; FREITAS, C. A. S. Avaliação do gerenciamento de resíduos de óleos lubrificantes e suas embalagens em oficinas mecânicas da cidade de Pombal – PB, Brasil. **Revista Verde de Agroecologia e Desenvolvimento Sustentável,** v. 9, n. 4, p. 53-58, out-dez 2014.

SOUZA, C. L. de. **Barreiras e motivações à adoção de práticas de Green Supply Chain Management:** estudo de casos no setor de baterias automotivas. (Dissertação de Mestrado 2013)**.** Disponível em: <HTTP://hdl.handle.net/11449/93070>. Acesso em 22 de maio de 2015.

TOPPE, J; BRANDALISE, L. T; ROJO, C. A; BERTOLINI, G. R. F. Evolution Of Critical Success Factors In The Eco-Friendly Market. II Simpósio Internacional de Gestão de Projetos. **Anais...** São Paulo – SP, Brasil – 07 e 08/11/2013.

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