

THE PERCEPTION AND THE ENVIRONMENTAL BEHAVIOR FROM THE SERVANTS OF THE WESTERN PARANÁ STATE UNIVERSITY UNIOESTE IN RELATION TO THE BIODIESEL USE

Reis Mendes Reis, Universidade Estadual do Oeste do Paraná - UNIOESTE
Cascavel, Paraná, Brasil, alexandre.reis@unioeste.br
Claudio Antonio Rojo, Universidade Estadual do Oeste do Paraná - UNIOESTE
Cascavel, Paraná, Brasil, rojo_1970@hotmail.com;
Loreni Teresinha Brandalise, Universidade Estadual do Oeste do Paraná -
UNIOESTE Cascavel, Paraná, Brasil, lorenibrandalise@gmail.com;

ABSTRACT

This article has the purpose of justifying the perception of the servants from the Western Paraná State University – Unioeste about the biodiesel use in the energy generation of the institution. For this purpose, it was performed a descriptive research applied to the Unioeste – Campus Cascavel servants an instrument adapted from the VAPERCOM model, that identified the servants that have some kind of connection with biodiesel or possible users, being those drivers, labor researchers, machinery technician, physiotherapy's' servants from the clinic and their respective superiors. The product was classified considering the steps of the product Life Cycle Analysis (LCA). As result it was observed that the product has a strong ecological characteristic in all life cycle steps, especially at the raw material steps, production process, use and disposal. Whereas the consumers (Unioeste servants) show to have a medium concern about the raw material steps and production process and frequently concern about the product use, allowing investment in the production, application and improvement in the characteristic of this product aiming the ecological capability and different ways of using it. Therefore, it allows the waste capture that has environmental impact and pollutants generator as well contributing with the sustainability and energy economy in the university.

Key words: biodiesel, sustainability, VAPERCOM, LCA, environmental perception.

1 INTRODUCTION

The concern about the environment has increased in life people, from the visible damage effects caused by the man all over the years. The companies that are pointed as degradation agents of the environment have been positioned with responsible environmental actions that aim to gain or to regain the society that is now preoccupied about environmental issues. This concern is transforming people perception in relation to this awareness. Besides, it is instigating a correct environmental culture in the society, aiming to modify the ways and demands of consuming from the consumers. Therefore, it fit to the companies to readjust to this new context, pursuing to use the available resources in an efficient way, studying and appropriating all the product life cycle (BRANDALISE, 2008).

Therefore, this research has the purpose of answering the question: What is the perception from the Unioeste servants in relation to the biodiesel? To answer this

question, this issue has the objective of identifying the perception of the consumer in relation to the Life Cycle Analysis of the biodiesel product produced by the Western Paraná State University – Unioeste.

As the specific objective, it was analyzed the life cycle and identified the environmental characteristics of the product, trying to understand the interaction between the produce steps and the environment, once that the LCA analyses the study from the life cycle of the product, since the extraction from the natural resources to its final disposal.

These issues its justified because to know and to understand the perception and behavior of the consumer in relation to the LCV can subsidies the decisions make of the institutions from their expectative, in the sense of producing, using, creating actions, products and correct environmental projects in the market that attend the environmental perception.

Besides, the attention to the environmental issues bring a positive result to the companies, resulting in the competitive vantages in comparison to other organizations. The creation of environmental culture in the companies passed to be a competitive factor, as a source of culture and knowledge, or as a source of qualification to stay in the market (BARBIERI, 2010). Another important factor is to promote the people perception about what it is the organizations' role in the society and in the part that it is insert, becoming it each day more value and thereby environmental correct.

2 THEORETICAL FOUNDATION

This study has the objective of understanding different aspects: since the environment context, the relevance of the environmental management, the product Life Cycle Analysis (LCA) the perception from the academic researchers and the administration technician from the Unioeste about the actions related to the biodiesel use in the organization researched. From the theoretical reference it was developed the research with the application of an adaption from the VAPERCOM¹ model about the product object of this research.

2.1 Contextualization

In the beginnings, the human being took from the enviroment only the resources needed to their survival, without generating pollutants residues and with no waste. Their actions do not commit or affect the nature, however, the society passed through many

¹ The model named as VAPERCOM considering: VA = Variável Ambiental (In English enviromental variable), PER = Percepção (in English Perception) and COM=Comportamento de compra (in English purchase behavior). The propose of the model VAPERCOM, developed by Brandalise (2006, relate the enviromental varaible, the perception and the purchase behavior based on the existence of a process that oriente the buyer conduct influenced by the enviromental variable that are consider in its consume according to their perception.

transformations, as changes in the life conditions, as in the evolution of the man. Therefore, the perceptions of the human in relation to nature suffered great changes (BRANDALISE, 2008).

The Protocolo de Kyoto (1997) which started nearly two decades ago, perfectly adapts to the global reality of nowadays. In this way, one of the great challenges to the XXI is:

“[...] To get a future of sustainable energy to the Earth, where the current standards of energy resources and the use of energy shows to be prejudicial to the well-being in the middle as in the long term of the humanity.

The harmony and integrity of the essential natural systems are each day more in risk because of the climate changes caused by the gas emission in the atmosphere, irregular extraction of natural resources, ecologic disasters, environmental contamination, and others. [...]”

Therefore, even with all this unmanageability in the management of the environmental issues, there are an appeal of the civil society and organized with the public power and the other organizations, aiming to reduce more and more the environmental impact caused in the production process of goods and services.

This research it is justified because the search for new ways of electric energy generation besides of an environmental problem it is a necessity from companies and others organizations and it is each day more necessary to propose new ways and mechanisms to available electric energy to inside of those organizations and also provide an ecologically friendly environmental management.

2.2 Environmental management in the organizations

There is a clamor in the society, so the public power adopts environmental politicians' actions not only in the fine ways and severe punishments, but in an awareness way, so the organizations adopt this politics in a natural way with a new environmental culture. Besides that, the organizations incorporate ethical and moral values, projecting the social and environmental responsibility all over the years.

“The environmental management consists in a tool that has as mainly objective, the search for continues improves of the environmental quality in the products and services and even in the intern environment of the organization”.

In this way, the environmental management is a set of directives with administration and operational activities developed in the organizations, aiming to

approach the environmental problems caused by the operation and production, analyzing environmental impacts of this operations, having the objective of avoiding or reduce the environmental problems that are happening or may happen at the future

The implementation, the incentives and the regulation from the biodiesel at the university will promote not only an institution as an organization that develop the environmental education, but also as a sustainable organization in the environmental managing area. Therefore, it shows the role of the university preparing professionals that will be acting as agents of the development and as promoter of an environmental culture in order to the sustainability.

2.3 Product Life Cycle Analysis (LCA)

The product Life Cycle Analysis (LCA) is a great tool of supporting in what is related to environmental issues and that offer competitive advantages to the business (BRANDALISE, 2008). It is through this analysis that the organizations quantify and obtain the data about the environmental development. It helps in the length of the life of its products and/or process, besides, the LCA is a tool that allow competitive advantages in the business' world, therefore allowing to evaluate the environmental development of a certain product and/or process.

It also allows to identify and measure the energy utilized in the productive process aiming to analyze the environmental impacts since the process of fabrication to the finish of the cycle of the product. Therefore, it evaluates all the environmental impact generated allowing the development of ideas to improve the production with the maximization of the resources and minimization of residues and pollution generated (QUEIROZ; GARCIA, 2010).

2.4 Perception and behavior of the consumer

The consumers have perceptions, sensations, likes and necessities so different as people have about life. Besides of the aspects related to their individuality, the consumer also is a social being and it is insert in a society, that in a certain way standardize their behavior in relation to other people from the same group (KARSAKLIAN, 2004). Basically, there are two factors that influences in the buying, the intern, as the components of a psychological structure, formation and future expectative from the individual and the extern factors that it is the environment that they live. (CASAS, 2009)

The consumers are each day more preoccupied with environmental issues and a pursuit for an environment culture that has the objective of conscious consumption. They search for products and services that develop an ecological variable and reduction of the environmental impacts promoting the engagement of the organization in relation to the environmental preservation and responsible social practices.

The analysis of the consumer behavior is fundamental to the financial growth and the increase of the income in the organizations, considering that through this analysis it is understood that the consumers' behavior is allow by that, the achievement of the satisfaction, in other words, before, during and after the buying, allowing to identify the needs, desires and perceptions of the potential clients (IBDAIWI; GARCIA; LOPES, 2012).

The study of the consumers behavior goes beyond from the moment that the consumer pays and from the product receiving. It is related to analysis from the process choice, the buy, the use of a product and the experience of satisfaction of the

individuals. The initial phase of the study behavior comprehends and represent the interaction between the consumer and what it is produced (SOLOMON, 2009)

Therefore, to exist an strength relation between the consumers and produces must be, in fact, an harmony before even exist the acquisition of the good or services. The relation must not delimit for the buy, the company must construct a good relation and a good image from the actions and the previous positions to the consumer process.

2.5 VAPERCOM Model

This study follows a model developed by Brandalise (2008), which it is denominated

as Variável Ambiental, Percepção e Comportamento do Consumido Environmental Variable (VAPERCOM), that in English means Perception and Consumer Behavior, that model was structured to evaluates the consumer perception considering the environmental variable in the steps of the Life Cycle Analysis (LCA) of a certain product that aim to allow the organizational competitiveness .

The model proposed was developed considering three elements that act directly about the consumer in macro environment: the environmental variable; the incentives (extern and intern factors); and the influences (social, marketing and situational), and that concern about the another three elements associated to the product and consumer: the tool LCA, the perception and the buy process.

There is a relation between those elements, where all they interact in a spiral, interconnecting each other and influencing directly the buy purchase and the consumer choice, resulting in an environmental behavior. Based on the environmental behavior allied to the LCA tool that apprehends and analyses the steps of the product process (since the extraction of the raw material to the disposal of the product) allowing the producer a more precise support about their products to define the strategy of performance and allowing the contributing to the environmental preservation.

2.5.1 Steps from the VAPERCOM model

The VAPERCOM management model was developed according to four steps: a) the characterization of the product and the potential consumer; b) identification of the researcher profile, environmental perception, ecological consumer and the LCA steps; c) identification of the discrepancies (gap's) between another's environmental characteristics of the product and the ones that the consumer notes; e, d) definition of action opportunities. At 1st step the question block is composed aiming to identify the profile of the researched such as age, sex, instruction, family income and information source about the environmental issues and the LCA. On the 2nd step, the questions are direct to the interviewed aiming to analyze the environmental perception with information related to actions, environmental conduct to the routine, reduction and conservation of the consume resource, the reuse and recyclability. The psychograph characteristic includes the individual necessities, perception, attitude, personality and lifestyle and they are important because they are personal or intrapersonal determination. In the 3rd step the questions formed are related to the ecological consume, analyzing the behavior of buying and consuming, considering the

elements: renewable material, energy consume (in the using), useful life of the product, reuse and recyclability, intending to classify the buy behavior, consume and profile of the consumer. On the 4th step, the objective is to identify the level of perception of the consumer in relation to the environmental variable in the behavior of each step from the LCA. The questions are direct to the raw material, produce process, use, after use and disposal of the product, considering the reduce of the elements, reuse and recyclability

The information got are tabulated in the box 01, the questions are multiplied by the number of times that each answer (a) by the respective punctuation attributed by it (b). Add all the results (c) and this individual is divided by number of questions related to the ecological perception (d).

(a) N° ANSWERS	(b) VALUES	(a X b) RESULTS
A	4	
B	3	
C	2	
D	1	
E	0	
(c) RESULTS		
(d) N° OF QUESTIONS		
(e = c / d) RESULTS		

Box 01: Allocation of weights and elaboration of perception level, ecological consume and the concern in relation to the LCA.

Source: Brandalise (2008)

3 METHODOLOGY

This issue had the purpose of analyzing the life cycle from the biodiesel product, to identify the perception and the behavior from the Unioeste servants (potential consumers) in relation to the product life cycle analysis (LCA).

The approach of this study is characterized as a quantitative research since it proposes to measure the level of perception from the consumers in relation to the environmental variable. It is approaching the methodology outlined adopted in the research, highlighting the kind of study made, their nature, the collection tools of data and the analysis techniques and data interpreted.

According to Gil (2002) it also fits as a descriptive research having as principal objective to determine the population or phenomenal, or even stablishing the variable analysis.

The descriptive research also has the objective of analyzing and interpret the reality without intervene to modify it, even the compromise can explain the phenomenalism that describe it, although it can be use as base to that explanation (CHURCHILL, 1987)

To better understand the perception and analyze a potential consumer profile it was developed by Brandalise (2008) the VAPERCOM model denominated as this because consider three elements: VA variável ambiental (in English environmental variable), PER perception and COM comportamento do consumidor (in English consumer behavior) about the environmental issue the moment of purchase.

This model is a strategic tool to identify the perception of the environmental variable, analyzing the life cycle of the product in the consumer vision. To achieve the objective proposed in this research it was use the probability sample, the intentional kind, in the intentional sample it was select a population subgroup based on the information's available, it can be considered as representative of all organization analyzed because it has typical characteristics or representatives of the group (ARIBOMI e PERITO, 2004).

The primers data was got through the appliance of questionnaire formed by four blocks of closed questions of multiple questions with preset alternatives applied to 28 State University of Western Paraná – Unioeste servants related directly or indirectly to sectors that involves biodiesel, being those lab technicians, researchers professors that develop projects and the biodiesel fuel as source of energy generator and also to the physiotherapy clinic of Unioeste, where there are warm pools with biodiesel use.

4 DATA ANALYSIS AND RESEARCH RESULTS

According to the data, it is present in here the results through the research made initiated by the presentation of product that is the biodiesel, a renewable fuel produced in the university get by vegetables sources (soya, castor bean, palm, sunflower and others)

The development of this research it was necessary to meet all the productive process from the biodiesel in the institution. The information was got directly in biodiesel lab, besides of the research through questionnaires directed to administrative technicians and researchers' professors of the Unioeste.

The biodiesel product as already mentioned is a renewable fuel, being those produced from vegetables source, mixing with ethanol (derived of sugarcane) or methanol (it can be gotten stem from biomass wood). It is a clean fuel, organic and renewable. Initially the production of the biodiesel uses three distinct way being those: greasy residues of the Agroindustrial, fried oils and virgin oil of grain pressing. In this process, the production from the initial project in the plant implementation it was of propitiating the use of Technologies innovations of the agribusiness, farmers from Western and Southwest from Paraná and mainly about incentivize and stimulate the urban environmental education.

To understand a possible demand, it was built at Unioeste a biodiesel plant (Picture 05), being those stablished as a source of researching and social economic and environmental development to the university. As the production of biodiesel still in scale because it is prototype of a complex of biodiesel, the production is limited just to attend a determined institution sector, however if it constated the economic and environmental viability and obtain financial source to the investment, there will be a possibility that this project attend not just the university, but also the community being traded in partnership with others companies.

4.1.1 Biodiesel production at Unioeste

In conjunction with schools and the community it was pursuit to present the biodiesel as a awareness project of the adequate destiny to vegetable oil residues, not restrain just to the biodiesel and bio soap but also propose to try another uses of fried oil from resources of process already consolidate. It is still presented the possibility of the development of Technologies of new products and raw material, aiming to innovate

the market demand.

In the first step of the “biodiesel” project it is stimulated the selective collection at the city of Cascavel together with the secretary of education of environmental of the municipal government, aiming to pursuit new partnerships to structure awareness campaigns to the collect and the correct treatment and destination of oil collected in the associations in local restaurants, neighborhood friends society, bars, market, snack bars, hotel, schools, assistances entities and another residues generators.

In the second step, the project pursuit partnership with farms from the family agriculture of the western aiming to obtain grains to allow the biodiesel production. To be obtain it is necessary to separate it from the vegetable oil by means of chemistry reactions. This is made mainly by two process which the most use is transesterification – vegetable oil reaction to alcohol (methanol or ethanol – common alcohol used in automobiles made by sugarcane), with the participation of a catalytic (substance that accelerate the chemistry process), which produce the biodiesel and as by-product the glycerin (product used in soaps).

According to Reginaldo Ferreira professor and coordinator of biodiesel production lab, he explains the biodiesel production by using the technology of thermal/catalytic cracking (process that causes the molecular break by higher temperatures – in other words it makes that the substance dissolves) highlighting the biodiesel production in small locations.

In the cracking process there is a relative higher expansive with thermal energy, once that the molecular break happens from the 350° C and the production it is in a small level “about one thousand of liters per day”. On the other hand, the technology seems to be more adequate in small locals, especially the biodiesel (produced by cracking) it is chemistry equal to diesel got by petroleum, but also sulfur – a highly pollute element.

As the most part of the production depends on the capture of grains usually got by donations, it is not possible to stipulate an exact reduction line, in other words, the quantity of biodiesel produced depends on the raw material got, which can variable in a month.

After all the biodiesel produced process, the product is directed to the energy production being those directed to fuel the generator engine in the physiotherapy clinic and other generators engine distribute by the institution. The sawdust is generating (pic. 02 and 03) from the extraction of oil from grains and it is a sub product used as bovine feed, which shows the environmental success of this project, as long as even the disposal is utilized, which determined a higher environmental element in all the steps.



Picture 01: Brand produced.
Source: Photographed by the authors



Picture 02: Brand produced.
Source: photographed by the authors.

4.1.2 The physical structure from the biodiesel lab

The production process of the biodiesel is a project from Unioeste in a partnership with the Secretaria de Ciência e Tecnologia do Estado do Paraná – SETI/PR, aiming to stimulate the production of biodiesel with an environmental activity in the university, besides of promoting sustainability and viability from a new technological energy generator.

The project has a room of processing and analysis of the fuel and a shed where there are an extruder press and a biodiesel plant acquired with SETI resource. Besides, it also has a biodiesel analysis lab with tools that allows to verify the quality and efficacy of the product. The plan is in the physical space of the Western Paraná State University – Unioeste, in Cascavel, Paraná, Brazil.



Picture 03: Extruder machine.
Source: Photographed by the authors



Picture 04: Arrested *in natura* of the soya oil.
Source: Photographed by the authors



Picture 05: A part of the biodiesel plant. Source:
Photographed by the authors.



Picture 06: Equipment of the reagentes composition
Source: Photographed by the authors.

About the human resource, the project counts with two researchers' professors, a lab technician and an intern. The basic expenses (water, light, phone, intern's salary) are pay with the Cascavel campus resource. And about the input, maintenance, machinery purchase and equipment the funds are pay for the own institution resource in a partnership with the SETI.



Picture 07: Researchers professors.
Source: Photographed by the authors



Picture 08: The equipment of biodiesel analysis.
Source: Photographed by the authors



Picture 09: Mix of the plant.
Source: Photographed by the authors



Picture 10: Biodiesel carrier;
Source: Photographed by the authors

4.1.3 The biodiesel advantages

In face of the rise in price of the petroleum and the Electric energy, multiplex nations have been having economic difficulties in import this input, or even facing suppling problems. In this context the demand for alternatives sources and mainly renewable energy has arisen the global attention to the agriculture raw material production, in especial the ones that have viability to the production of ethanol and biodiesel.

According to Christoff (2009) there are three mainly advantages of the oil residues oil from fried as the raw material to the production of biodiesel, the first is related to the technological aspect is characterized for the waiver from the oil extraction process; the second is related to the economical aspect that it is characterized for the raw material because that are related to a residue of an oil residue of fried that has a stablished market price; the third is an environmental aspect characterized for the adequate disposition of a residue, which in general is discarded inappropriate causing a soil impact and a water table on consequence in the biota of

these systems. There is other directly and indirectly advantages in the use and in the production of this biodiesel being those:

- Product with a correct and strong environmental appeal;
- To promote the sustainability in the institution;
- The combustion (the burning fuel) generate low levels of pollutions, contributing with the global warming reduction;
- To increase the employment and direct income as much in the field as in the city according to the expansion and production growth;
- Renewable energy source depends on the cultivation of oil grains;
- Reduction of financial expenses with electric energy in the institutions

4.1.4 Biodiesel disadvantages

The advantages of the use/and biodiesel fabrication cannot be calculated or measure in an objective way, but come of them can be listed as:

- A big investment according to the grown and product demands considering that there is no investment of privity fund in this step;
- Accreditation investment and in the certification and quality control, demanding a line of an adequate production;
- Skilled labor;
- Waste capture (residential oil), lack of structuring, equipment's and staff to an adequate selective collection.

4.2 Profile identification, environmental perception, ecological consume and awareness in the LCA step

The research instrument model is in the appendix 1, 2 and 3, this research was applied at Unioeste – Campus Cascavel between on May 16 and 27 of 2016, a sample of 28 technicians' servants and professors related directly and indirectly with the "biodiesel" project in Unioeste. During the appliance of forms, it was presented to the interviewed the researcher's objectives.

In the sequence, it was presented the development step since the appliance model, with the characterization from the researched public, level of environmental perception and ecological consume as the level of concerning with the LCA steps.

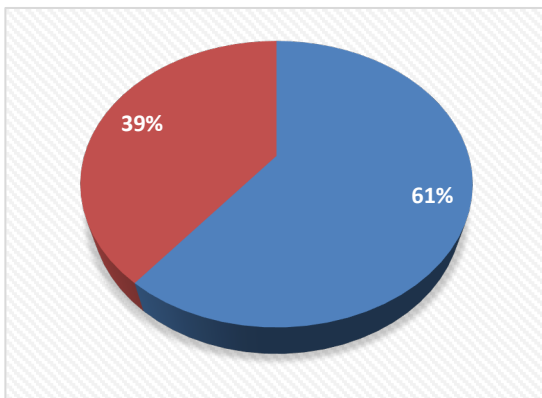
4.2.1 01 BLOC – SEARCHED CHARACTERIZATION

This set of information presents the searched characterization, the biodiesel consumer potential in relation to the searched profile such as sex, age, family income, information source about those environmental questions, knowledge about the LCA and environmental impact generate about the products use.

It was applied 7 questions to know all the fundamental characteristics of the searchers, presenting the following results: from all people that answer the

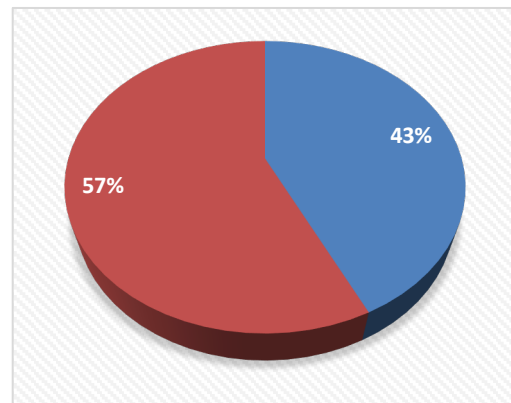
questionnaire, 17 people are from the male sex and 11 female sex. 43% from the interviewed have the same age or age higher than 40 years. 56 % have a familiar income of 7 minimum salaries and 8% obtain information's through some media (tv, radio, newspaper, internet, magazine and others)

About the Life Cycle Analysis (graphic 01), 7% knows all the process and 21% know, but still have doubts about the process and 72% knows the LCA. From all interviewed people 48% knows that the product that they use cause some environmental impact, 22% have doubts about the environmental impact and 30% do not know that the process can cause some environmental problem.



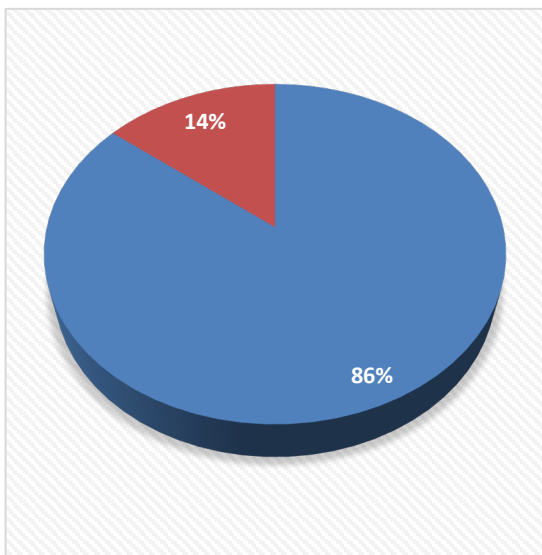
61%Male 39%Female

Chart 01: Interviewed characterization.



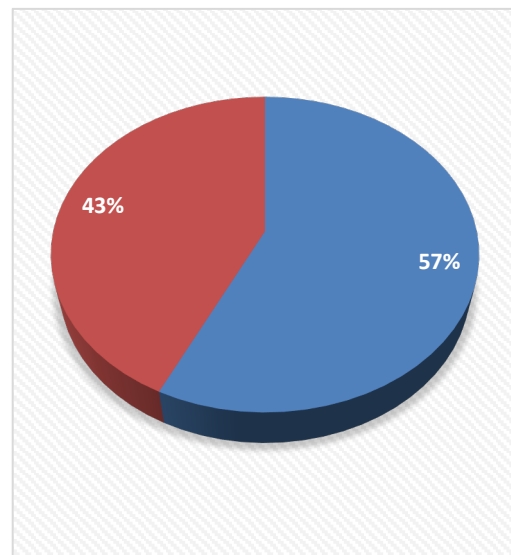
Age 43% equal or higher than 40 years
Below 40 years

Chart 02: About the searche's age.



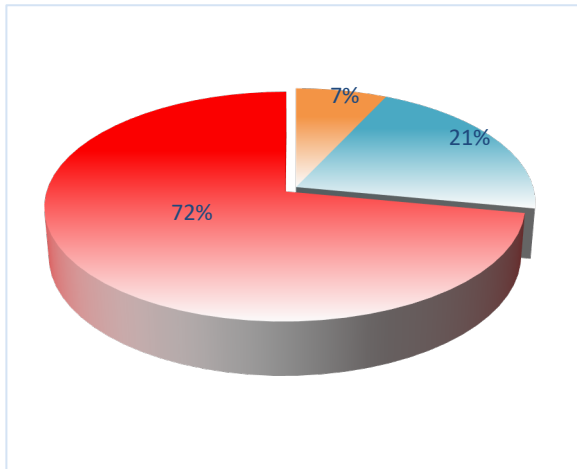
About the environment questions
86% Get informations through some media.
14% Get informations in other ways

Chart 03: Knowledge about environmental issues.

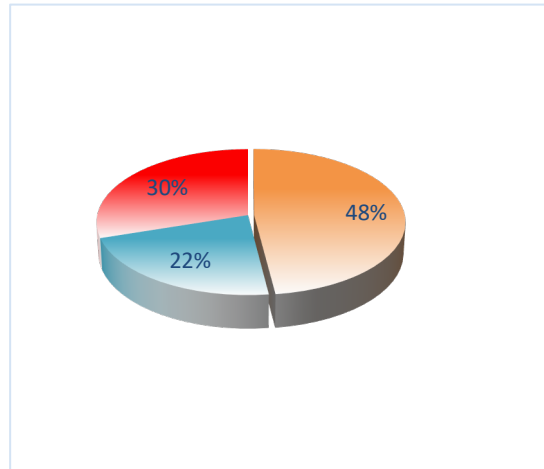


Family income
Family income about 7 or more minimum salaries
income below 7 minimum salaries

Chart 04: Family income.



7% Knows all the LCA process
 21% Knows, but have doubts
 72% Do not know any LCA process
 Chart 05: Analysis from the LCA interviewed



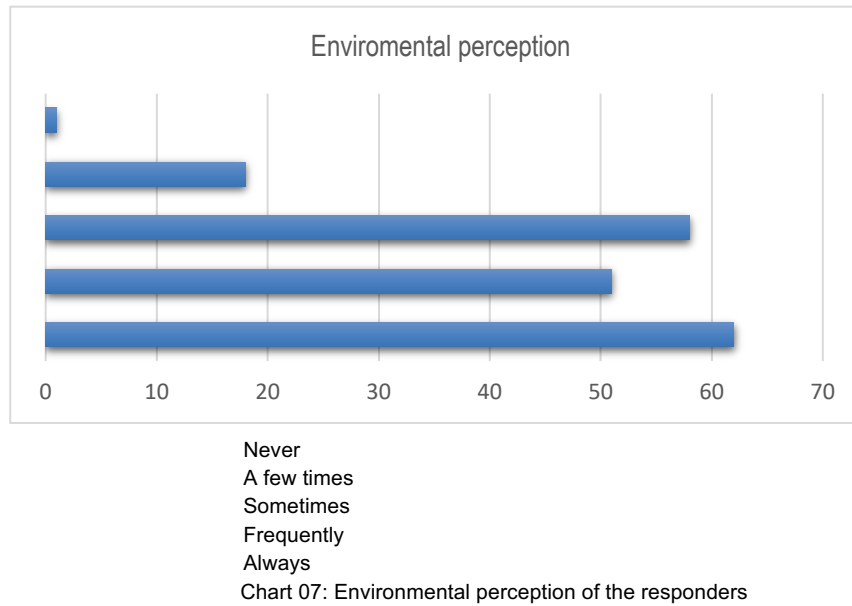
48% Knows that the product causes environmental impact
 22% Have doubts about the environmental impact
 30% Do not know if the product causes some environmental impact
 Chart 06: Environmental impact of the consumed product

4.2.2 BLOC 2 – ENVIROMENTAL PERCEPTION

The questions made to detect some environmental perception are related to the environmental routines conduct, analyzing the elements of reduction/conservation from consume resource, reuse and recyclability, verifying the level of perception and conduct of the consumer, considering the environmental variable.

According to the appendix 01, the answer frequency of the questions 08 to 14 from the collect instrument. The data got according to the researches were the following ones: A = 62; B= 51; C = 58; D =18; and E = 01, according to the data found, the score was of **2,81**, using the score board the classification of the environmental perception level of the presents in the box 02, the population “have an ecological perception”.

It is noted according to the set of questions, the alternative A got the higher number of responding, specially the number 11 (Do you turn off the lights, turn off the tv, the radio, fan/heater when you leave a room?); and, 12 (Do you avoid to leave the tap running when you brush your teeth or shave your beard?), respectively.



4.2.3 BLOC 3 – ECOLOGICAL CONSUME

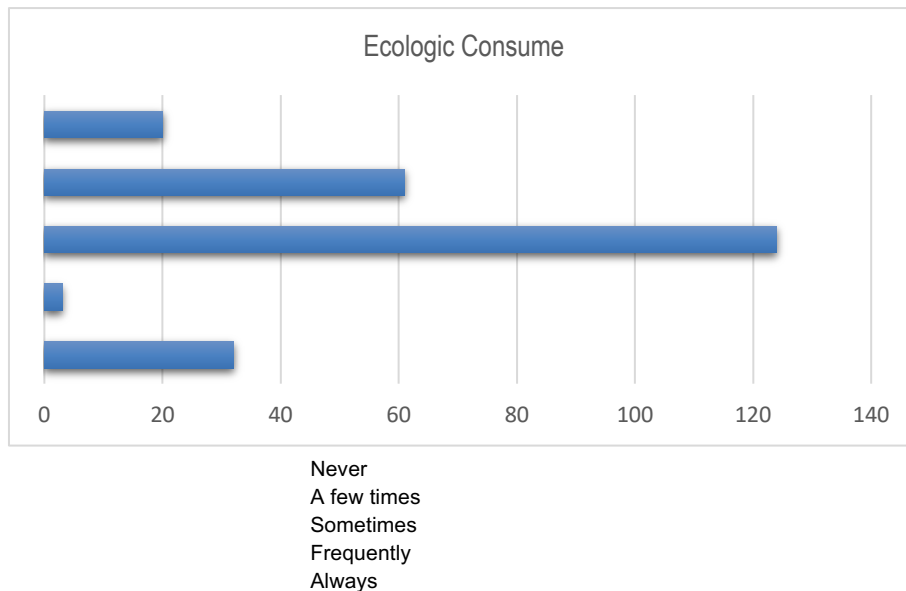
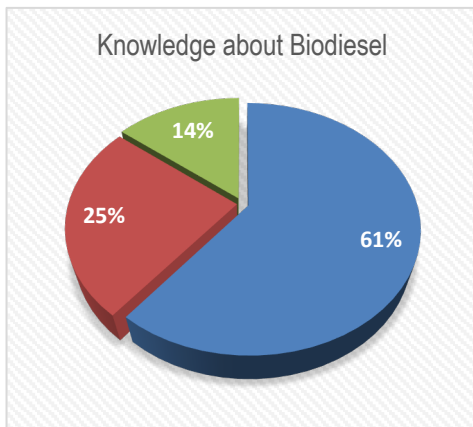
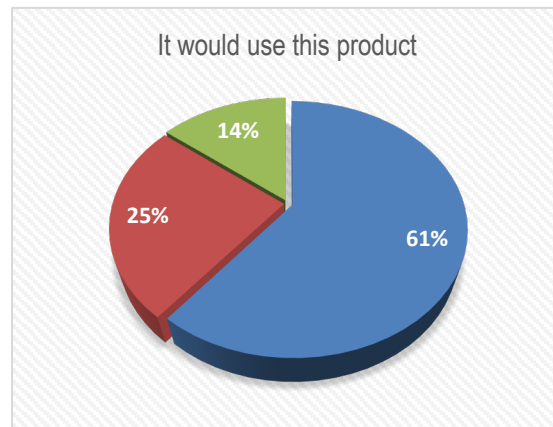


Chart: 08: Ecologic consume of the respondings.

The questions 26 to 27 are about the biodiesel, what it is knowledge of the interviewed about it and if they would use the biodiesel product and the most part 63% opt for yes, in other words they know or already heard about the product.



61% Yes 25% No 14% I have doubts
Chart 09: It is about the biodiesel knowledge



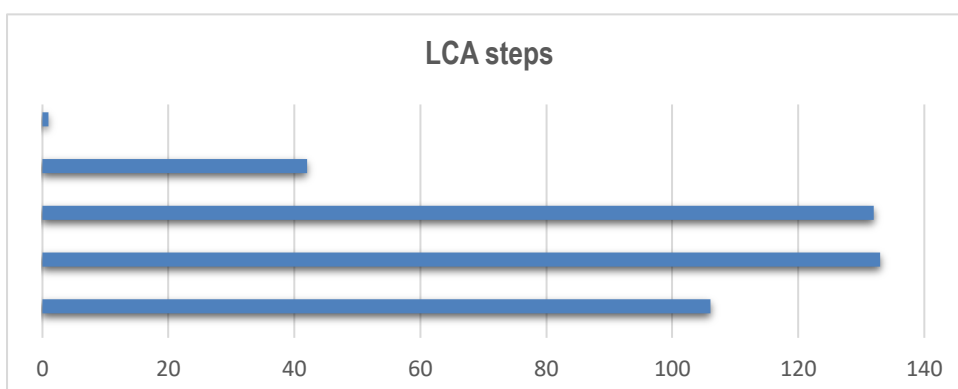
61% Yes 25% No 14% I have doubts
Chart 10: If they knew the benefits, they would use the product.

4.2.4 BLOC 4 – ALC STEPS

In this bloc of questions, it is analyzed the awareness from the interviewed in relation to the raw material, production process, using, post using and product disposal. It is considered the reduction elements, reuse and recyclability.

The objective of this set of questions is to identify and classify the level of the consumer perception in relation to the environmental variable in the purchase behavior and the consume of each of the LCA step.

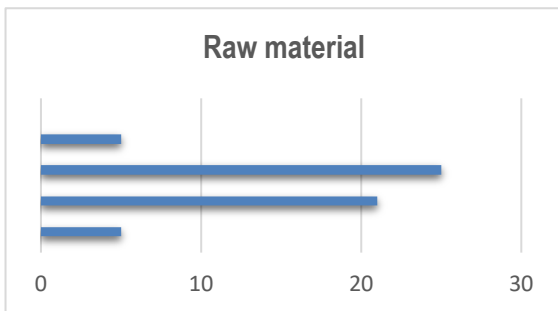
About the values, the data are the following ones: A = 106; B = 133; C = 132; D = 42; e E = 01. It is observed that the alternatives B and C got the most part of the answers, specially the questions 28, 29 and 37 respectively where the consumer is characterized as “I frequently care about it” and “an average concern”, in accordance to the appendix 03.



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A poor concern
Average concern
I frequently concern
Strong Concern

Chart 11: Steps from the Product Life Cycle Analysis.

About the analysis of the score got in this bloc of questions it was use the box 01 and the respective values attributed to alternatives answers. According to box 01 it was got a score of **2,72** and according to the level of perception classification in relation to the LCA it was presented “frequently concern” in relation to the LCA steps. Analyzing individually the life cycle of the product it can be defined as “average concern” to the “raw material” and “production process” aspect, as “frequently concern” for the aspects “product use” and “product post use”, and “always strong concern” for the aspect “product disposal”. These are the charts about the LCA of this research:



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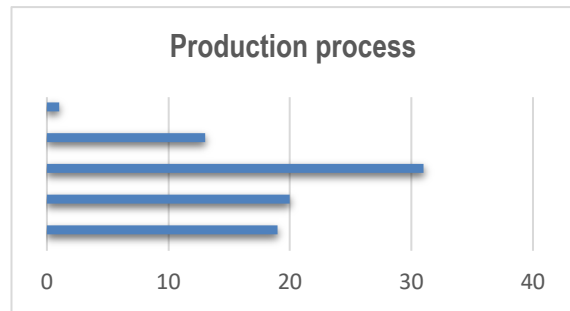
A poor concern

Average concern

I frequently concern

Strong Concern

Chart 12: Product life cycle analysis about the raw material.



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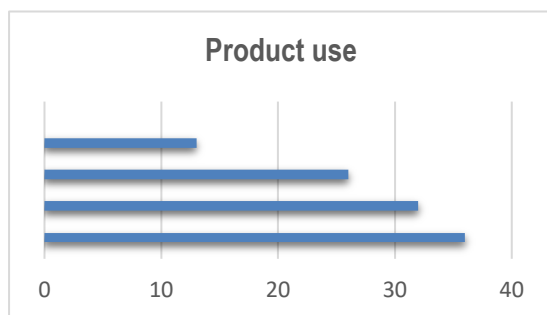
A poor concern

Average concern

I frequently concern

Strong Concern

Chart 13: Product life cycle analysis about the pruction process.



No cocern

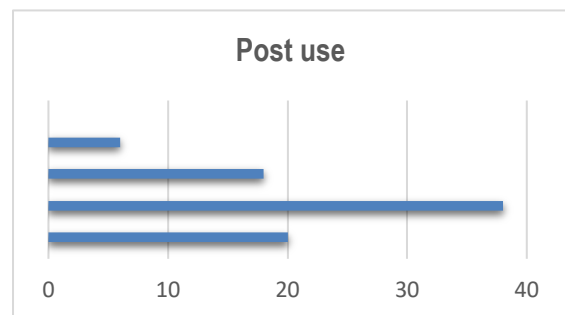
A poor concern

Average concern

I frequently concern

Strong Concern

Chart 12: The product life cicle analysis about the product use.



No cocern

A poor concern

Average concern

I frequently concern

Strong Concern

Chart 13: The product life cicle analysis about the post use product.

U

No cocern
A poor concern
Average concern
I frequently concern
Strong Concern

Chart 14: the product life cicle analysis about the product disposal.

4.3 Identification of the discrepancy between the product characteristic and the consumer perception

According to the crossing of the environmental and ecological correct characteristic of the product and the concern level results in relation to the LCA got through the appliance of a questionnaire, the results got are presented in the box 3.

LCA STEPS	ENVIROMENTAL IMPACTS RELATED TO THE BIODIESEL	ECOLOGICAL CHARACTERISTIC	
RAW MATERIAL	Origin of the resources	Arising of renewable resource (water for the creation). Oil obtained from suppliers and grains collect in determined locals	Strong.
	Enviromental impact in the extraction	Low enviromental impact. At no charge of extraction and acquisition of raw material.	Strong.
PRODUCTION PROCESS	Energy consume	Low.	Strong.
	Generation of solid residues, liquid effluents and air emission	There is no residues generation, liquid effluents and air emission. There is no generation of harmful residue in the nature during the oil extraction from the grain. The liquid effluents and the air pollutants rest are insignificant.	Strong.
	Fuel consume in the transport and distribution	Low	Strong.
USE	Product life	Long storage period.	Strong.
	Energy necessity	Low. Only refrigeration and prepare.	Strong.
	Potential contamination of the environment	No risk	Strong.
	Packaging	Low. Plastic and returnable pack.	Strong.
POST-USE	Reuse possibility.	There is no possibility of reuse the product (the package can not be recycled)	Average
	Potentiality of recovering the materials	There is no potentiality (the product)	Average
	Recycle possibility	There is no possibility (the product)	Strong.
DISPOSAL	Risk level and toxicity	There isn't	Strong.
	Material volume	Low	Strong.
	Biodegradability	It is biodegradable	Strong.

Chart 03: Characterization of the product in the most important LCA steps.

Source: Search applied (2016)

CONCLUSION

The organizations creation and development of environmental and sustainable projects shows to be very important, because besides of straighten up the institutional mark, it also helps to solve intern problems related to activities and the economic and strategic development in the institution.

On this way, the “Biodiesel” project developed at Unioeste shows to be highly sustainable and environmentally friendly, considering that besides of providing the residues collect with environmental impact and polluting generator that it is the case of oils used in fried and also it is possible to provide energy to the institution.

The VAPERCOM model used in this research provides the collect the necessary information to the consumer behavior analysis considering their environmental variable perception.

According to the data obtained all the product Life Cycle Analysis have strong ecological characteristics mostly in the raw material phase, production process, use, posture and disposal, when it was possible to confirm the efficiency of this institutional project.

This study provides to verify what are the consumer potential inside of the university and if they have the necessary perception of the biodiesel use as an energy source in the institution. Besides, the biodiesel research at Unioeste was already used as base for lots of articles and six dissertations of master’s Energy in Agriculture and other issues.

It is also important to highlight that this project attends all the requisites to an environmental management institution, considering that it analyses the study of economic and social activities in a way to use in rationally the natural resources, including energy resources being those renewable or not. Furthermore, it allows the reduction from the direct costs, diminution of waste of raw materials and resources that are increase scarce such as the electric energy.

REFERENCES

- BARBIERI, J. C.; VASCONCELOS, I. F. G.; ANDREASSI, T.; VASCONCELOS, F. C. Inovação e sustentabilidade: novos modelos e proposições. **Revista de Administração de Empresas**, São Paulo, v. 50, n. 2, abr./jun., p. 146-154. 2010.
- BIODIESELBR. **O que é biodiesel?** Disponível em: <http://www.biodieselbr.com/biodiesel/definicao/o-que-e-biodiesel.htm>. Acess in: may of 2016.
- BRANDALISE, L. T. **A percepção do consumidor na Análise do Ciclo de Vida do produto: um modelo de apoio à gestão empresarial**. Cascavel: Edunioeste, 2008.
- BRANDALISE, L. T. **Modelo suporte à gestão organizacional com base no comportamento do consumidor considerando sua percepção a variável ambiental nas etapas da Análise do Ciclo de Vida do produto**. 2006.
- CHRISTOFF, K.; KERAMATIAN, K.; GORDON, A. M.; SMITH, R.; MADLER, B.. Prefrontal organization of cognitive control according to levels of abstraction. **Brain Res.** 2009 Aug 25;1286:94-105. doi: 10.1016/j.brainres.2009.05.096. Epub 2009 Jun 6. Disponível em; <https://www.ncbi.nlm.nih.gov/pubmed/19505444>. Accessed in May of 2016.

DIAS, R. **Gestão Ambiental: responsabilidade social e sustentabilidade**. São Paulo: Atlas, 2011.

FUJIMORI, S; CERUTI, F. C. **Proposta para a implantação de uma mini-usina de biodiesel a partir de óleo de cozinha usado no município de Irati – PR**. In VII Semana de Engenharia Ambiental, 2009, Irati, PR.

KARSAKLIAN, Eliane. **Comportamento do consumidor**. 2º edição. São Paulo: Atlas, 2004.

ECÓLEO. **Reciclagem do óleo**. Disponível em: <http://www.ecoleo.org.br/reciclagem.html>. Accessed in May of 2016.

Appendix 01 – Frequencies of answers from the set of questions about ENVIROMENTAL PERCEPTION.

SET 02 – ENVIROMENTAL PERCEPTION		Always	Frequently	Sometimes	A few times
08	Before you throw away some garbage, do you think how you can reuse it?	4	0	13	1
09	Are you adept to recycle?	9	9	8	2
10	Do you separate garbage that can be recycle (paper, plastic, aluminum, glass, metal) and disposal it to the collect?	6	9	9	4
11	Do you turn of the lights, the tv, the radio, fan/heater when you leave a room?	14	7	6	1
12	Do you try to not leave a tap running when you brush your teeth or shave your beard?	11	8	8	1
13	Do you use both sides of papers or reuse it as scratch?	9	2	9	8
14	Do you avoid to to print unnecessary things?	9	6	5	1
Total		62	51	58	18

Sum of the results (C)	534
Number of questions (D)	190
Final Results (E = C/D)	2,81

Source: Questionnaire applied (2016)

Appendix 02 – Frequency of the set of answers about the ECOLOGIC CONSUMPTION

SET 03 – ECOLOGICAL CONSUMPTION		Always	Frequency	Sometimes	A few times
15	Do you consider the environmental variable when you buy a product?	2	8	14	3
16	When you buy something are you influenced by advertisements, friends or family in relation to environmental issues?	1	8	15	3
17	When you buy something, do you try to find if the company practices environmental actions?	1	7	7	8
18	When you buy something do you value the companies that have environmental correct perceive?	3	6	11	4
19	Before you buy something do you verify labels and package to identify if the product is environmentally friendly?	2	7	8	8
20	Do you look up products or packaging that are made from recycled material or that can be recycled?	3	5	11	6
21	Do you verify if the energy consumption when you buy a product?	8	7	11	2
22	Do you buy biodegradable products?	2	6	17	4
23	Are you keen to pay more for an ecological product?	1	8	12	6
24	Are you keen to change a brand of a product that helps the environment conservation?	3	6	10	8
25	Would you pay more for a notebook made with recycled paper or from reforested trees?	6	5	8	9
Total		32	3	124	61

26	Do you know or have ever heard about biodiesel? () Sim () Tenho dúvidas () Não
Answer: Yes – 17 I have doubts – 4 No – 7	

27	Considering the environmental benefits about this fuel, would you use this product? () Sim () Tenho dúvidas () Não
Answers: Yes – 17 I have doubts – 4 No – 7	

Sum of results (C)	656
Number of questions (D)	310
Final results (E = C/D)	2,11

Source: Questionnaires applied (2016)

Appendix 03 – Frequency of set of answer about LCA steps.

SET 04 – LCA STEPS		Strong Concern	I frequently get worry	Average Concern	Poor Concern
In relation to the raw material point a level of concern:					
28	Resources origin (if they are renewable)	2	10	14	2
29	Extraction enviromental impact (and in the transportantion)	3	11	11	3
Total		5	21	25	5
In relation to the produce process point a level of concern:					
29	Energy consumption (in the production)	8	3	12	5
30	Generation of solid residues, liquid efluentes and air emission	5	10	8	5
31	Fuel consumption in the storage or transportation and distribution	6	7	11	3
Total		19	20	31	13
In relation to the product use point a concern level with:					
32	Product life	8	10	5	4
33	Energy necessity	8	9	7	4
34	Polluting potention to the enviroment	11	7	9	2
35	Package (tyee and/or volume)	9	6	10	3
Total		36	32	26	13
In relation to the post-use of the product point a concern level:					
36	Reuse possibility	7	12	8	1
37	Potentiality of reutzilization of components	4	15	6	1
38	Recycle possibility	9	11	4	4
Total		20	38	18	6
In relation to the product disposal point a concern level with:					
39	Toxity and risk level	13	4	10	2
40	Material volume (including packaging)	7	8	9	4
41	Biodegradability	6	10	8	4
Total		26	22	27	10
GRAND TOTAL		106	133	127	47

Sume of the results (C)	1.129
Numebr of questions (D)	414
Final results (E = C/D)	2,72

Source: Questionnaire applied (2016)

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