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CONSUMPTION DECISION OF ECONOMIC AGENTS: COST VS. ENVIRONMENTAL AWARENESS[*]

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Abstract

Research aimed at the search for the sustainability of the planet through the development of environmentally friendly goods (green goods), has generally shown, in its marketing process, a cost higher than the sale price of a substitute good. conventional that does not equally satisfy the reduction of climate change. From the recognition of the average income per individual of a developing country and attending to the rational consumer microeconomic theory, where it seeks to maximize profit with the acquisition of goods at an optimal price and where satiety does not exist, This document, using a mixed exploratory type methodology, seeks to identify from behavioral economics, how willing is the existing demand in the market to the acquisition of a green good with a value higher than its substitute goods, and what are the characteristics of the individual that reflects within its consumption conditions the environmental benefit; at the end of the investigation, the data evidenced by the primary information acquired from surveys is concluded, which reflects conditions of the consumption decision based on age, income, educational level, among other aspects.

Keywords: behavioral economics, costs, environmental responsibility, profit maximization

1. Introduction

In response to Sustainable Development Goal number 12, which seeks reconciliation between economic well-being, natural resources and society, and considering the current effects of global warming, many have been research projects aimed at generating products that are friendly to the environment (green goods); however, these types of goods generally have a market value higher than the value associated with substitute goods that are

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conventional and do not represent any type of environmental benefit. In accordance with the above, in the face of a budgetary restriction of the economic agents of developing countries, can one adopt the position of the classical economic theory of utility maximization, based on the principles of rationality and non-satiety, or does it exist the need to be a responsible consumer with the environment independent of the fact that this commitment implies assuming a higher price level?

The present article, with an exploratory-type methodology in which primary information was collected from the conduct of surveys of students from various universities in the city of Medellín - Colombia, will present, within the framework of behavioral economics, the decision to individuals in relation to the maximization of utility, to consume a conventional good at a lower cost or to acquire a product with an environmental commitment but with a cost higher than the existing goods on the market, being an active part of the work for environmental sustainability ; also evidencing the additional percentage that individuals would be willing to offer for the acquisition of a green good and the characteristics of the citizens who choose consumer decisions. Evidence in the results.

In accordance with the above, the objective of this research is to identify the additional resource that economic agents would be willing to pay for the consumption of an environmentally friendly product compared to a conventional good, in addition to the identification of own variables of each consumer influencing the purchase decision and the observed discount rate due to the change in prices over time.

This process will help to identify the potential demand of the green products market for organizations that currently work in this type of goods and, of course, know if tireless work for sustainable development has allowed greater awareness in purchasing and level of consumption by economic agents for the mitigation and reduction of climate change.

Climate change is defined as the increase in the average temperature of the planet due to an unusual increase in greenhouse gases (GEI) caused by human activity. During the last 30 years of the last century, the global average temperature increased by about 1.8°C, representing the same increase as that which occurred in the previous 70 years. These new geo-climatic conditions will define the production and consumption decisions of the economy, generating, among others: (i) decrease in water-generating sources, (ii) modification in the pattern of rainfall, (iii) extreme weather events, (iv) rise in sea level, (iv) which ultimately have an impact on the well-being and quality of life of human beings.

These effects will be seen with greater intensity in tropical regions where factors such as: the low capacity to develop prevention and mitigation policies and fragile economic structures are added to the increase in temperatures.

Colombia is no stranger to the effects of climate change. At the national level, preliminary estimates found that, as a result of this phenomenon, annual decreases equivalent to 0.5% of GDP could be generated. In the case of Antioquia, for example, this loss in aggregate production would be equivalent to an average drop in well-being, translated into a general consumption of less than 2.9% with respect to the scenario without climate change (United Nations, 2018). In addition to this view, (Paniagua Paniagua and Hernández García, 2013) affirm that in Antioquia there is a low level of planning and coordination among the initiatives that lead to the development of adaptation measures and care for the environment, regarding the different manifestations of the climate, and it is necessary to generate a higher level of awareness of the possible effects of global warming on all levels of society.

Although the potential effects of climate change are a recurring theme on global and national political agendas, there is little scientific evidence on the availability of economic agents for the consumption of environmentally friendly goods, where it is generally assumed a market value higher than that of a product produced without environmental contribution objectives.

2. Sustainable development goals

Faced with the environmental problems experienced in the world and recognizing that the scope and causes of global environmental degradation are increasingly important issues, because there are many signs that the planet can no longer afford the relentless exploitation of materials (Hao, 2014); The United Nations Development Program (UNDP) mentions in the sustainable development objectives in its number 12 of responsible production and consumption, the urgency of a reduction in the ecological footprint from a change in the production and consumption of goods and resources for sustainable development.

According to the previous idea, in Colombia, there have been several economic sectors that have opted to work to make efficient use of natural resources, as shown by the study carried out by the Ministry of Environment and Sustainable Development – MADS (2012) (Fig. 1).

Fig. 1. Participants by sector of green markets in Colombia
(Source: National Strategic Plan for Green Markets (PENMV))

Although the advance in the use of waste and industrial production with economic growth but with environmental sustainability, has presented an advance in the market, there are several economic sectors that are still lacking due to the development of a work aimed at environmental awareness and this is largely due to the cost associated with new research and development processes that imply additional costs at the production level, which in the end, become part of the final price of the good to be marketed.

Now, from the consumer's point of view, some statistical data such as that made by BASF's Home Care Unit, mention that 38% of Colombian consumers are more concerned about the use of environmentally friendly products, unlike countries like Argentina with 16%, Chile with 23%, Peru with 32% and North America in general with 34% (Fig. 2).

According to Fig. 2, there is the possibility of expanding the spectrum of economic sectors that operate in Colombia for the production of environmentally friendly goods according to existing demand; however, the question remains of how available the consumer budget is in the face of changes in the price of an environmentally friendly good based on the fact that academics have long argued that environmental preferences decrease during economic recessions, since that people prioritize short-term economic needs over long-term environmental concerns (Mildenberger and Leiserowitz, 2017).
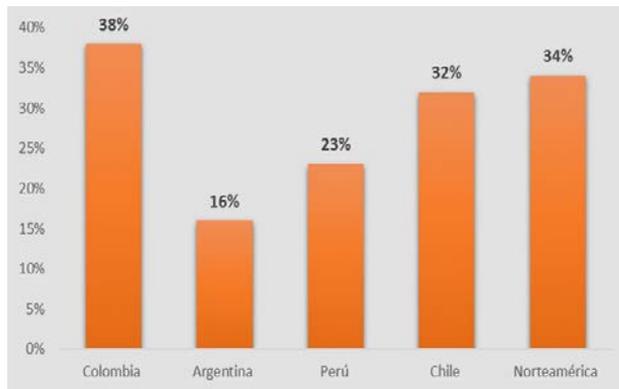
Fig. 2. Consciousness of consuming environmentally friendly products.
(Source: own elaboration with data obtained from the BASF organization (Schweens, 2017))

3. Experimental economics and its relevance

From the consumer theory, there is a rational economic agent who makes decisions seeking to maximize their utility under the principle of satiety and conditioned to a budget constraint.

In general, environmentally friendly products have a higher selling price than conventional goods for the costs associated with their development and production; that is why, under the consumer theory, there is no reasonableness in the consumption of these goods in reference to their market value, unless the consumer utility approach has a greater relationship with environmental sustainability (Escobar-Moreno et al., 2015).

From the behavioral economy, it is evident how agents make consumption decisions based, in one way or another, on the altruism of supporting future generations with the purchase of green products that support environmental sustainability, which is the percentage of money that they would be willing to assume for the purchase of an environmentally friendly good instead of the purchase of a conventional product with a lower price and what are the characteristics of the individuals who make the consumption decisions represented in the data non-experimental instruments used in research.

Under responsible production and consumption called to work on the objectives of sustainable development, many have been the organizations that have started with the elaboration of environmentally friendly products; from cassava bags, pitchers with cricket flour, to skateboards and electric cars, they have been created as an innovation factor in search of climate change mitigation. However, the work in research and development (R&D) and the additional costs associated with the production of the goods in question, imply a higher sale price, assumed by the final consumer, than that of a conventional good existing in the market.

4. Methodology

The research process contemplates an exploratory-type methodology, where the collection of non-experimental data will be carried out through 69 surveys carried out on students from the Faculty of Economic and Administrative Sciences, from four universities in the Metropolitan Area of the municipality of Medellín with different socioeconomic conditions.

During the exercise, the informed consent was presented to the respondents, mentioning the objective of the survey, the duration and the conditions for its development; understanding as the main consideration, that the process is strictly individual.

Once all the surveys had been carried out, the information was tabulated, the data interrelated in the R program through modeling using the Ordinary Least Squares (OLS) methodology and later, the presentation of the results obtained.

5. Results

From the primary information collected with the preparation of the surveys carried out on 69 students from four universities in the Metropolitan Area of the municipality of Medellín, the characteristics observed in the following histograms are presented (Fig. 3). The variables analyzed were:

- gender;
- age range;
- marital status;
- number of dependent people;
- income level;
- employment status

Each of the requested data has a relationship with the variables that affect consumer behavior, evidenced in the bibliographic information that precedes the results.

Fig. 3 shows the behavior of the variables requested in the first part of the survey. In the case of gender, a very similar relationship is presented with the percentage of men and women that the population of the study focus area represents.

There is an age range consistent with the environment where the sample was drawn. Approximately 70% of those surveyed have between the ages of 18 and 40, which is generally the type of agent, as mentioned in previous sections, with a higher level of environmental awareness. However, in consumption decisions, other aspects come into play, such as socioeconomic household level (where is relevant a 44.1% of surveyed located in level 3), employment status and the responsibilities associated with other individuals, which prevent access to green goods at a higher cost under a budget constraint with major limitations. Its optimal basket of primary goods has not been fully satisfied for its sustainability.

At this point, the variables have divided information that will be analyzed with the rest of the questions associated with the survey.

Regarding the questions related to the main objective of the research, modeling was performed using the ordinary least squares (OLS) methodology.

To present the results, the exercises were divided into two stages based on the group of women and the other of men.

As a result of the model, it stands out that the coefficient of the variable *LevelcommitmentB*, of 0.016, shows that a person who is willing to buy low-cost friendly products (10.000 COP), is not necessarily willing to do it for high-cost products (30.000.000 COP). Additionally, the level of patience is not a significant variable of the model, despite the fact that the coefficient is positive 0.3287.

Besides, when the standard errors of the parameters are analyzed, *LevelcommitmentB* presents the lowest value, while *Levelofpatient* and the *constant* show very high values of 0.31 and 0.09 respectively.

5.1. Men vs. Women

Taking the information from the previous analysis but performing a comparative analysis between men and women, a first exercise is carried out comparing the possibility of acquiring a high-cost product (30.000.00 COP), given that a low-cost product was previously purchased for cost 10.000 COP.

When an analysis of Table 1 is developed, it is observed that men have a greater willingness to buy a high-cost, environmentally friendly product, once a low-cost one was purchased, with a coefficient for the variable *LevelcommitmentB* of 0.160, versus the 0.016 obtained by the women. It should also be noted that the constants are significant in both exercises, while the *Levelofpatient* is not significant for either. The variable with the highest standard error is *Levelofpatient*.
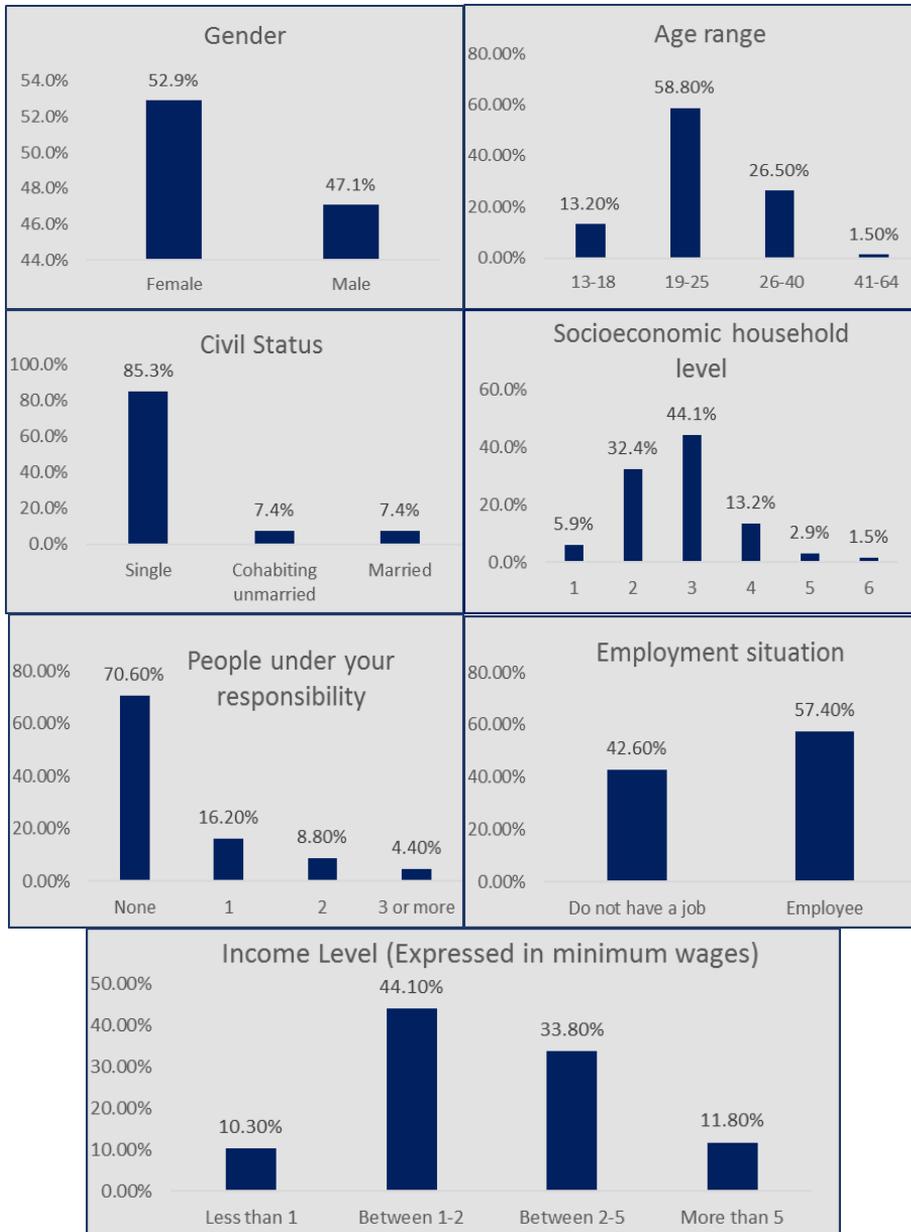

Fig. 3. Histograms of variables studied (Source: own elaboration (2020))

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. reg NivelcompromisoA NiveldecompromisoB Niveldepaciencia

     Source |       SS       df       MS              Number of obs =      36
------------+------------------------------           F(  2,    33) =    0.61
      Model | .08786505        2 .043932525           Prob > F      =  0.5495
   Residual | 2.37789884      33 .072057541           R-squared     =  0.0356
------------+------------------------------           Adj R-squared = -0.0228
      Total | 2.46576389      35 .070450397           Root MSE      = .26844

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NivelcompromisoA |    Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------+----------------------------------------------------------------
  LevelcommitmentB |  .0161032   .0627903    0.26   0.799    -.1116446    .143851
      Levelofpatient |  .3287116   .3168304    1.04   0.307    -.3158848   .9733079
             _cons |  .4196607   .0909713    4.61   0.000     .2345782   .6047432
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Fig 4. Modeling Results. Group Women.
(Source: own elaboration (2020))

Table 1. Men vs Women results

Variable	Men			Women		
	Coefficient	*p>|t|*	*Std Err.*	*Coefficient*	*p>|t|*	*Std Err.*
Constant	0.459	0.000	0.091	0.419	0.000	0.091
LevelcommitmentB	0.160	0.017	0.063	0.016	0.799	0.062
Levelofpatient	-0.202	0.567	0.349	0.328	0.307	0.317

Source: own elaboration (2020)

Table 2 compares men and women again but changing the dependent variable to *LevelcommitmentB*. In this case, both women and men increase their coefficients compared to the previous exercise (Table 1), 1.135 men versus 0.124 women. Also men have the highest coefficient.

These results show consistency in the sense that once the highest price has been paid, is expected that a person buy a low-cost product. Again, the level of patience is not a significant variable, and presents the highest standard error, while the *constant* is significant for women; it is not the case for the men´s exercise.

Table 3 performs the analysis defining the dependent variable *LevelcommitmentB*. In this case, an analysis is made between the group of people who work and those who do not.

When the results are analyzed, it stands out that for both groups the variable *LevelcommitmentA* is significant, with coefficients of 0.962 and 1.050 for the group of workers and non-workers respectively. It is important to note that the *constant* and the *Levelofpatient* are non-significant variables in the exercises, while the *Levelofpatient* presented the highest estimation error.

Table 2. Men vs. Women results – reverse

Variable	Men			Women		
	Coefficient	*p>|t|*	*Std Err.*	*Coefficient*	*p>|t|*	*Std Err.*
Constant	0.218	0.513	0.330	0.859	0.005	0.286

| Levelcommitment4 | 1.135 | 0.017 | 0.446 | 0.124 | 0.799 | 0.481 |
| Levelofpatient | 0.354 | 0.706 | 0.931 | 0.538 | 0.548 | 0.887 |

Source: own elaboration (2020)

Table 3. Employee vs Do not have a job Results

Variable	Employee			Do not have a job		
	Coefficient	p>|t|	Std Err.	Coefficient	p>|t|	Std Err.
Constant	0.369	0.344	0.385	-0.160	0.695	0.409
Levelcommitment4	0.962	0.095	0.561	1.050	0.114	0.643
Levelofpatient	0.426	0.694	1.070	1.680	0.213	1.310

Source: own elaboration (2020)

6. Discussion

Many investigations have been carried out regarding environmental sustainability, however, the relationship of the information found in the bibliographic references with respect to the work addressed is low.

Among the documents identified that have a greater relationship with the investigation, is the article "Preliminary characterization of the Antioquia green consumer: The case of consumers in the Aburrá Valley" (Escobar-Moreno et al., 2015), which evidences some characteristics of the consumers with tendencies to the acquisition of green goods or friendly products with the environment; however, the research does not respond to the percentage of additional value that the analyzed consumer would be willing to pay for this type of goods and the level of profit produced conditioned to the additional cost paid under a budget restriction.

Other authors present researches regarding the benefit that the environment could have from the use of green goods, as is the case of the article "*The role of renewable energy, immigration and real income in environmental sustainability target. Evidence from Europe largest states*" (Alola et al., 2019), where the impact on the consumption of renewable energy and the migration of carbon dioxide emissions are identified. Concluding that the consumption of said energy allows a decrease in carbon emissions, reflecting in turn the importance in the consumption of environmentally friendly products, in total relation to this text.

Some additional research, such as "Ethics, environment and economy" (Barragán and Mendoza, 2006), It seeks to analyze what are the ethical parameters that must be considered, so that being aware of the maximization of consumer utility, the change between economic ethics and ecological ethics is elucidated.

To complement the results of this research, mention may be made of the research carried out by (Escobar-Moreno et al., 2015) in which they mention that consumers of green products are people with medium and high income levels, therefore that it is important, then, when defining the importance of the consumer in acquiring an environmentally friendly good, identifying the relationship in his decision and variables characteristic of each individual, which can directly influence such as budget constraint, among others . For a better understanding of all aspects of consumption, an analysis of the most traditional contexts should be carried out based on behavioral economics (Foxall, 2016); that allows to demonstrate not only the consumer's position, but also business decisions, based on the commitment of managers to contribute to sustainable development that is key to the success

of business in the long term and can be a source of advantage competitive (López Gamero et al., 2008), counting in turn that investment in research and development or in new plants and equipment, may involve high costs when taking actions to reduce pollution (López Gamero et al., 2008), but environmental policies often include a trade-off between short-term costs and long-term public services (Bilgen and Sarıkaya, 2016).

7. Conclusions

Based on the results obtained in the modeling, the scenarios where *LevelcompromiseB* is defined as a dependent variable, demonstrate that when a person is willing to pay a higher value for an environmentally friendly good of a high value (30.000.000 COP), you can also do it with lower value products (10.000 COP). This situation is not necessarily true in the opposite sense, given the significant difference that occurred in prices.

When the behavior of women was analyzed, versus that of men, it was determined that this last group presented a greater availability to consume environmentally friendly goods, however, the response of women was also positive.

Additionally, in terms of the employment situation, people who do not work showed a greater willingness to pay more for environmentally friendly goods compared to the group that works, possibly because the first group has a dependency and the second an obligation economic, which implies that the budget constraint and its relationship with periodic commitments, leads to a greater limitation and consumption decision is directly related to the price, but not the environmental benefit that entails.

In terms of policy, the importance of constructing research material that, in context on the subject of global warming and the consumption of environmentally friendly products, in relation to the behavior of economic variables such as the growth of Gross Domestic Product, is highlighted. in order for public authorities to understand the relationship of income with environmental awareness and design schemes that mitigate the impacts of climate change. From the experimental and behavioral economics, incentives can be proposed for people, allowing the consumption of these goods in a more massive way, or designing preferential tax schemes for companies that produce this type of product.

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