

FUNDAÇÃO GETULIO VARGAS
ESCOLA DE ADMINISTRAÇÃO DO ESTADO DE SÃO PAULO

VIVIANE MONTEIRO

***DOES THE PLANNED OBSOLESCENCE INFLUENCE
CONSUMER PURCHASE DECISION?
THE EFFECTS OF COGNITIVE BIASES: BANDWAGON
EFFECT, OPTIMISM BIAS AND PRESENT BIAS ON
CONSUMER BEHAVIOR.***

SÃO PAULO

2018

VIVIANE MONTEIRO

***DOES THE PLANNED OBSOLESCENCE INFLUENCE
CONSUMER PURCHASE DECISIONS?
THE EFFECTS OF COGNITIVE BIASES: BANDWAGON
EFFECT, OPTIMISM BIAS AND PRESENT BIAS ON
CONSUMER BEHAVIOR***

Applied Work presented to
Escola de Administração do
Estado de São Paulo, Fundação
Getúlio Vargas as a requirement
to obtaining the Master
Degree in Management.

Research Field: Finance and
Controlling

Advisor: Samy Dana

SÃO PAULO

2018

Monteiro, Viviane.

Does the planned obsolescence influence consumer purchase decisions? The effects of cognitive biases: bandwagons effect, optimism bias on consumer behavior / Viviane Monteiro. - 2018.

94 f.

Orientador: Samy Dana

Dissertação (MPGC) - Escola de Administração de Empresas de São Paulo.

1. Bens de consumo duráveis. 2. Ciclo de vida do produto. 3. Comportamento do consumidor. 4. Consumidores – Atitudes. 5. Processo decisório – Aspectos psicológicos. I. Dana, Samy. II. Dissertação (MPGC) - Escola de Administração de Empresas de São Paulo. III. Título.

CDU 658.89

VIVIANE MONTEIRO

***DOES THE PLANNED OBSOLESCENCE INFLUENCE
CONSUMERS PURCHASE DECISIONS?
THE EFFECTS OF COGNITIVE BIASES: BANDWAGON
EFFECT, OPTIMISM BIAS AND PRESENT BIAS ON
CONSUMER BEHAVIOR.***

Applied Work presented to Escola de Administração do Estado de São Paulo, of the Getulio Vargas Foundation, as a requirement for obtaining a Master's Degree in Management.

Research Field: Finance and Controlling

Date of evaluation: 08/06/2018

Examination board:

Prof. PhD. Samy Dana

Advisor

EAESP - FGV

Prof. PhD. Leandro Angotti Guissoni

EAESP – FGV

Prof. PhD. Roberta Muramatsu

Universidade Presbiteriana Mackenzie

Acknowledgment

To all who directly and indirectly were part of my story. Thank you!

To God, all glory!

I dedicate this work to all the children of the past and the present who haven't had the opportunity to study, feed themselves and live safely.

ABSTRACT

Last year, we watched more scandals involving a technology giant accused to apply a dishonest practice called Planned Obsolescence, which, according to some consumer's protection organization would raise its company profits and breach consumer's rights. Countries as the U.S, Italy and France are fighting against its practice and other reason to its battle is the reduction of electronic waste. But regarding to purchase decision would any company have power enough to make someone buy their product, in this case mobile device, just slowing down its performance? To assess consumer behavior and purchase decision a survey with 358 Brazilians was conducted for four weeks. The main goal was to understand which cognitive biases can drive consumer to perceive planned obsolescence and if its planned obsolescence is a fundamental factor for purchase decision. The participants were divided into control group and treatment group. The control group receives a survey with generic questions and the treatment group received questions that suggested cognitive bias influences as Optimism bias, Present bias and Bandwagon effect. The results of this study show no significant impact related to the planned obsolescence in the classical conception (what has been disclosed by the media in last years) primarily with individuals between 40-60 years, but show a significant impact regarding to perceived psychological obsolescence with individuals younger than 40 years. The actual Brazilian economic scenario can explain the conservative behavior in the older age group. On the other hand, the need of acceptance and feeling of belonging which is one of some characteristics of bandwagon effect phenomena drive the behavior of the younger age group.

Keywords: Planned Obsolescence, Decision Making, Consumer's behavior, cognitive bias.

RESUMO

No ano passado, foram assistidos escândalos envolvendo uma das maiores empresas do segmento de tecnologia, acusada de aplicar uma prática chamada obsolescência planejada, que, de acordo com organizações de proteção aos consumidores, aumentaria os lucros da empresa e violaria os direitos dos consumidores. Países como os EUA, Itália e França estão lutando contra esta prática por motivos econômicos e de proteção ao meio ambiente. Porém, em relação à decisão de compra, qualquer empresa teria poder suficiente para fazer alguém comprar seu produto, neste caso, um aparelho de telefonia celular, apenas retardando seu desempenho? Para avaliar o comportamento do consumidor e a decisão de compra, uma pesquisa com 358 brasileiros foi realizada durante quatro semanas. O objetivo principal era entender quais vieses cognitivos podem levar o consumidor a perceber a obsolescência planejada e se a obsolescência planejada é um fator fundamental para a decisão de compra. Os participantes foram divididos em grupo controle e grupo tratamento. O grupo de controle recebe uma pesquisa com perguntas genéricas e o grupo de tratamento recebeu perguntas que sugeriram influências de vieses cognitivos como viés de Otimismo, viés de Presente e efeito de Manada. Os resultados deste estudo não mostram nenhum impacto significativo relacionado à obsolescência planejada na concepção clássica (o que foi divulgado pela mídia nos últimos anos), principalmente, com indivíduos entre 40-60 anos, mas mostram um impacto significativo em relação à obsolescência psicológica percebida com indivíduos com menos de 40 anos. O atual cenário econômico brasileiro pode explicar o comportamento conservador na faixa etária mais avançada. Por outro lado, a necessidade de aceitação e o sentimento de pertencimento, que são das características dos fenômenos do efeito manada, impulsionam o comportamento do grupo etário mais jovem.

Palavras-chave: Obsolescência planejada, tomada de decisão, comportamento do consumidor, vieses cognitivos.

List of Figures

Figure 1: Mapping of identified categories to Cooper's theory	51
Figure 2: Questionnaire division.....	52
Figure 3: Opinion Box Platform	53
Figure 4: Opinion Box Sample question.....	53
Figure 5: Survey monkey platform: Survey with cognitive biases applied	54
Figure 6: Survey monkey platform: Survey with cognitive biases applied – Sample question.....	54
Figure 7: Survey Monkey Platform: Survey without cognitive biases applied.....	55
Figure 8: Survey Monkey Platform: Survey without cognitive biases applied – Sample question	55
Figure 9: Relative Obsolescence x Absolute Obsolescence according to Cooper (2004)	56

List of Tables

Table 1: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Bias: Psychological Obsolescence x Bandwagon Effect	48
Table 2: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Bias: Economic Obsolescence x Optimism Bias	49
Table 3: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Bias: Technological Obsolescence x Present Bias	50
Table 4: Participants by gender.....	57
Table 5: Participants by age	57
Table 6: Results - Hypothesis 1	58
Table 7: Gender Analysis of Hypothesis 1:	59
Table 8: Age Analysis of Hypothesis 1:	60
Table 9: Results - Hypothesis 2	63
Table 10: Results Gender Analysis of Hypothesis 2:.....	63
Table 11: Results Age Analysis of Hypothesis 2:.....	65
Table 12: Results - Hypothesis 2b	66
Table 13: Hypothesis 2b Analysis per group	67
Table 14: Hypothesis 2b Analysis per group	67
Table 15: Hypothesis 2b Analysis per group	68
Table 16: Results – Hypothesis 3.....	69
Table 17: Results – Hypothesis 3 Analysis per group	70
Table 18: Results Gender Analysis of Hypothesis 3.....	71
Table 19: Results Age Analysis of Hypothesis 3.....	71
Table 20: Results – Hypothesis 4.....	72
Table 21: Hypothesis 4 Analysis per group	72
Table 22: Summary of hypotheses and results.....	73

Contents

1. INTRODUCTION	14
2. LITERATURE REVIEW	19
2.1 THE HISTORY OF PLANNED OBSOLESCENCE.....	19
2.1.1 The Phoebus Cartel.....	19
2.1.2 DuPont	22
2.1.3 Recent History of Planned Obsolescence	24
2.2 PLANNED OBSOLESCENCE: CONCEPTS AND CLASSIFICATION.....	26
2.2.1 Concepts.....	26
2.2.2 Classification.....	29
2.3 HEURISTICS AND COGNITIVE BIASES	34
2.4 THE BANDWAGON EFFECT.....	36
2.4.1 The Bandwagon effect and psychological obsolescence	38
2.5 OPTIMISM BIAS.....	39
2.5.1 The Optimism bias and Economic obsolescence	40
2.6 PRESENT BIAS	41
2.6.1 Present bias and Technological Obsolescence.....	41
2.7 HYPHOTESIS	42
3. METHODOLOGY	44
3.1 MARKET INFORMATION AND CONSUMER PRODUCT PROFILE	44
3.2 RESEARCH METHOD, PROCEDURE AND EXPERIMENTAL METHODOLOGY.....	45
3.2.1 Research method.....	45
3.2.2 Procedure	46
3.2.3 Experimental methodology	46
3.3 EXPERIMENT DESIGN.....	46
3.4 EXPERIMENT PERIOD AND PLANNING.....	52
4. RESULTS AND RESULTS ANALYSIS.....	56
4.1 RESULT ANALYSIS H1 - THE BANDWAGON EFFECT AND THE PSYCHOLOGICAL OBSOLESCENCE.....	57
4.2 RESULT ANALYSIS H2 – THE OPTIMISM BIAS AND PURCHASE DECISION	62
4.2 RESULT ANALYSIS H2b - THE OPTIMISM BIAS AND ECONOMIC OBSOLESCENCE	66
4.3 RESULT ANALYSIS H3 - THE PRESENT BIAS AND TECHNOLOGICAL OBSOLESCENCE.....	68
4.4 RESULT ANALYSIS H4 - PLANNED OBSOLESCENCE AND THE PURCHASE DECISION.....	72
5. CONCLUSIONS.....	73
5.1 STUDY LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCHS	75

Bibliographic references	76
Appendix.....	87
Appendix A - Questionnaire sent to Control Group	87
Appendix B - Questionnaire sent to Treatment Group	90

1. INTRODUCTION

The human relationship with the purchase action has been changing gradatively each year. Cultural and social issues also convert this connection. After the Second World War, it was essential to encourage people to spend money and warm up the market. It comes from this time the marketing stimuli through the image of modernity, freedom and power. Today is known that, people buy not only to satisfy their practical needs (buy some food, energy, house, car, medicine and clothes) but to satisfy emotional fragility and social needs as feeling of belonging. Some big companies in the market do not sell products or services, they play a game of experiences, something really exclusive, unique, and private.

At the beginning of the 20th century, years before World War II, and the beginning of psychological questions discussion's of economic issues related to human behavior, it was formed in Europe an association called "Phoebus Cartel" – an organization formed by the main manufacturers of lamps, which aimed at shortening the lamp life span produced by all cartel participants. Some time later the company DuPont was forced to review the manufacturer process of nylon stockings, in order to reduce the strength of the stockings and push the consumers to buy new products. (Stocking & Watkins, 1946)

The central idea about life span purposely reduction is also related to the idea about human rationality model, called Homo economicus - the figurative human being characterized by the infinite ability to make rational decisions. Thus, reducing products life span, would force this consumer, which is rational, selfish and with unbounded willpower to make repeated purchases, which would result in increasing in sales and profit.

Herbert Simon (1955) an early critic of modeling economic agents as having unlimited information processing capabilities, suggested the term "bounded rationality" to describe a more realistic conception of human problem-solving capabilities.

Conlisk (1996), showed us the theorist's failure to incorporate bounded rationality into the traditional economic models. Even with so much brainpower, it is not expected for us humans to solve difficult problems optimally. It is considered "rational" for people to adopt rules of thumb as a way to economize on cognitive faculties. However, standard model ignores these bounds and hence the heuristics commonly used.

Departures from rationality emerge both in judgments and in choice. The ways in which judgment diverges from rationality is long and extensive (Kahneman, Slovic, & Tversky, 1982). Some illustrative examples include optimism, bandwagon effect, present bias and

hyperbolic discount , and making judgments of frequency or likelihood based on salience (the availability heuristic) or similarity (the representativeness heuristic).

Another aspect of human behavior that is explored by the evolutionary perspective and play a very central role in the decision- making game are the emotions (Muramatsu, 2006). The emotions have been seen as impediments to rationality, getting in the way of good decision-making. However, it has become clear that emotions play a fundamental, indeed critical, role in decision-making.

Cognitive biases are mental and emotional filters in which an individual try to understand and respond to external events. They influence and impair an individual's ability to evaluate information objectively and logically. (Kahneman & Tversky, 1974)

The reasons for obsolescence and its presumable effect on consumer satisfaction or repurchase behavior have not yet been discussed broadly. Especially, the understanding if cognitive biases can influence obsolescence perception by the consumers in a given market place. Thus, this subject will be outlined and analyzed henceforth.

Therefore, the aim of the present study is to investigate if cognitive biases can induce the perception of planned obsolescence, concluding if planned obsolescence is a fundamental factor or not in the purchase decision.

In this sense, the specific research question that is expected to be answered during the accomplishment of this work, in order to achieve the proposed objectives, is: If cognitive biases such as the “Bandwagon Effect”, "Optimism Bias" and "Present Bias", can induce the perception of planned obsolescence, making it a decisive factor for purchase?

The Bandwagon Effect was chosen for analysis in this present paper, because is the phenomenon that leads the individual to make decisions based on the opinion and decision of the majority, which is present in all cultures and social classes and also occurs in relation to the purchasing decisions according to Mason (1981). In internationally conducted surveys on employability and consumption put Brazil in the fourth position among the most optimistic countries in the world, according to Grant Thornton Report (2011), which led to the choice of the Optimism Bias to study the present work. Finally, the dissatisfaction experienced by an individual for having to wait to have a certain reward, which presents itself not only in Brazilian society, but also in other countries, according to Shane, Lowenstein and O’Donoghue, (2002), has led to the choice of the Present Bias.

The Bandwagon effect is a psychological phenomenon that consists in the tendency to do or believe in something because a large number of people do. This is the bias that can drive the individual make unthinking decisions, based on the behavior of the majority. It is

synonymous with "herd behavior". Herd behavior is present in all phases of human life, from the nursery to the end of life. Advertising campaigns often use this trick to try to convince consumers that most people prefer a particular brand, product or service in order to induce impulsive and repetitive consumption without the individual considering the alternatives in the market. Not only do advertising agencies take advantage of this bias. It is observed that this bias is also present in a dominant way in some religious communities, where the influencing agent is a leader and the followers are led by the herd bias to think, consume and practice acts of civil life in a group, in ways that, the majority does become a kind of law for all participants in this group. At the juncture of this study, the herd effect may lead the consumer to perceive obsolescence through social pressure, fashion and media influence. People are more susceptible to the herd effect in situations of uncertainty, panic or in times when there is pressure for decision-making. When the consumer examines a particular product in a store, it is common for the seller to argue that everyone is buying it, that the stock is near the end, and that failing to buy would be a disadvantage. In the online environment, it is possible to find the same advice through information on the page as "last in stock", the "last mobile phone was purchased five minutes ago", "there are ten people viewing this promotion" and so on, to create the consumer feeling that the product is highly sought after. Other factors that cause the bandwagon effect are the fads, the euphoria provoked by the media and social networks, and the tendency to follow the general climate that sometimes installs in part of the society with respect to a certain subject. This is because the people feel more comfortable when they are part of groups, while the feeling of being left out, being rejected or not participating in a particular group is often unpleasant.

The Optimism bias is the tendency to overvalue the possibility of occurrence of positive events and neglect the risk of negative events. When people projects themselves into the future, they have a greater propensity to believe that they will be richer and healthier rather than to think that they may suffer an accident, acquire or develop diseases, or lose their job. The Bias of Optimism makes people imagine that the future will be better than the past and that everything will work out without the need for a more thorough examination of the circumstances. Namely the population examined in this study, Brazilians, are known worldwide for the optimism and joy. (Martinez, 2007). The dangerous manifestation of this bias is that it causes individuals to underestimate the risks, even if widely known, and to stop taking preventive behaviors, such as making unnecessary purchases, spending more than they should, not worrying about saving money for emergencies or constituting reserves for retirement. In the circumstances of this study, the bias of optimism may lead the consumer to

assign a small value or no value to his current mobile phone, which leads the consumer to the conclusion that it is not worth keeping it in use. Generally, individuals whose optimism bias presents more frequently in decision making, is the one who buys a mobile through the assumption of debts because the consumer believes that next month will be able to pay the debt (payment method: installments by credit card or direct financing with the selling store). These people generally have a tendency to have many debts and no investment and this optimistic behavior can lead to irresponsible choices in other areas of life.

Present bias can be exemplified as when an individual have the tendency to give greater weight to events closer to the present than to those located in the future, when they have to choose between two periods to allocate a monetary resource (O'Donoghue & Rabin, 1999). In the context studied, the consumer could have been driven to perceive the obsolescence of their mobile, because of the difficulty of resisting immediate gratification, in the context of this work. Usually these people find themselves attracted to technology and are always looking for mobile devices launches.

In order to answer the research question, we adopted a quantitative and experimental research approach, based on a laboratory experiment procedure, applied to the market of durable consumer goods, electronics, and more specifically mobile devices. The reasons for choosing this market segment were: In January 2017, ANATEL - Agência Nacional de Telecomunicações recorded a total of 243,419 million registered mobiles. A total of 117.65 appliances per 100 inhabitants. The Brazilian population spent about 650 hours per month accessing social networks in 2015, 60% above the global average and this access is made by the mobile phone. (Comscore, 2015), record profit from leading smartphone manufacturers and recent scandals involving industry giants: Apple and Samsung accused of intentionally shortening mobiles life span.

The experiment was conducted through a survey, whose target population was a sample of the Brazilian population, of all states and age group. The sample of respondents was divided into control group and treatment group. A common method to demonstrate that a variable affects a judgment (or decision) is to establish the correlation between the variable and the judgment, keeping the other factors constant. (Kahneman & Tversky, 1996). Thus, the independent variables evaluated in this study were cognitive biases "Present Bias, Optimism bias and Bandwagon Effect ", while the dependent variables (judgment or decision) were perception of obsolescence and purchase decision.

The contribution presented in this dissertation is of interest both in the academic field and in the business area. In the academic field, the study can add value to the study literature

of decision-making to purchase electronic devices, especially mobile phones, based on the perception of obsolescence. In Brazil, even in the academic world, the concept of obsolescence is little discussed. There are many concentrated papers on obsolescence in the field of sustainability and engineering studies, but in the field of economics and finance, this theme is not much exploited. In the corporate area, this research can contribute to the research and development professionals – R&D as also Marketing, as well as professionals in the areas of management and processes can: 1) generate insights and increase knowledge about the decision-making process of the consumer 2) stimulate investment in the development of more innovative products that meet the needs of adult consumers, in the age group between 45 and 60 years or more, who often resist technology and thus gain market share in this segment of consumers. 3) Encourage innovation as the main engine for competitiveness and thus generate value for the company as a way of maximizing profit for the company and consequently for the shareholder.

It is important to emphasize that, although it is not the focus, this work is also of interest to civil society, since it arouses the public's curiosity about the theme and makes them reflect on how the cognitive biases guide their choices.

The paper is organized into five chapters, divided as follows: the first one gives a brief introduction on the theme, presenting the research question and how it can be answered. The second chapter presents the theoretical framework, in which more details about the history of Planned Obsolescence and recent industry scandals, types of planned obsolescence, the three cognitive biases, and the hypotheses tested during the study are discussed. The third chapter addresses the methodology of applied research, justifying the applied method, and addressing all the details of the design of the experiment. The fourth chapter presents the results of the experiment and a breakdown of the analysis developed for each of the study hypotheses. Finally, chapter five presents the main conclusions and limitations of work.

2. LITERATURE REVIEW

In this chapter the objective is to explore the theoretical concepts that underlie the present work. It begins with the presentation of the concept of planned obsolescence and the history of obsolescence theory. The following are the recent scandals involving large electronics companies accused of intentionally practicing planned obsolescence. New concepts and types of planned obsolescence are also presented. Next, are presented all the details of each of the three cognitive biases studied and their applications to the concepts of planned obsolescence. Finally, the construction of hypotheses of study is exposed, which are based on the application of the three cognitive biases in the perception of planned obsolescence.

2.1 THE HISTORY OF PLANNED OBSOLESCENCE

2.1.1 The Phoebus Cartel

On 23 December 1924, a group of leading international businessmen gathered in Geneva for a meeting in which the top representatives from all the major light bulb manufacturers took part, including Germany's Osram, the Netherlands' Philips, France's Compagnie des Lampes, and the United States' General Electric. The group founded the Phoebus cartel; a supervisory body that would carve up the worldwide incandescent light bulb market, with each national and regional zone assigned its own manufacturers and production quotas. It was the first cartel in history to enjoy a truly global reach. By early 1925, this became codified at 1,000 hours for a pear-shaped household bulb, a marked reduction from the 1,500 to 2,000 work hours. Cartel members rationalized this approach as a trade-off: Their light bulbs were of a higher quality, more efficient, and brighter burning than other bulbs. They also cost a lot more. Indeed, all evidence points to the cartel was motivated by profits and increased sales. In carefully crafting a light bulb with a relatively short life span, the cartel thus hatched the industrial strategy now known as planned obsolescence. In the early 20th century thousands of manufacturers vied for market share and a technological edge, no single company felt assured of stable sales from one year to the next. That was as true for tiny backroom operations as it was for the giant corporate entities with multinational factories and research laboratories. Immediately preceding the cartel's formation, for instance, Osram experienced a dizzying drop in its German sales, from 63 million light bulbs in the financial year 1922–23 to 28 million the

following year. Not surprisingly, Osram head William Meinhardt was the first to propose the arrangement that eventually became the Phoebus cartel. (Krajewski, 2014)

The document that companies signed to join it was called the “Convention for the Development and Progress of the International Incandescent Electric Lamp Industry.” According to that document, the organization’s chief goals were “securing the cooperation of all parties to the agreement, ensuring the advantageous exploitation of their manufacturing capabilities in the production of lamps, ensuring and maintaining a uniformly high quality, increasing the effectiveness of electric lighting and increasing light use to the advantage of the consumer.” It covered all electric light bulbs used for illumination, heating, and medical purposes. In addition to the companies mentioned earlier, its members included Hungary’s Tungsram, the United Kingdom’s Associated Electrical Industries, and Japan’s Tokyo Electric. The U.S. Company GE, one of the prime movers behind the group’s formation, was itself not a member. Instead it was represented by its British subsidiary, International General Electric, and by the Overseas Group, which consisted of its subsidiaries in Brazil, China, and Mexico. Over the next decade or so, GE would acquire significant stakes in all the member companies that it did not already own. To oversee national light bulb markets and their respective development in global trade, Phoebus established a supervisory body, chaired by Meinhardt of Osram. The cartel’s other main activities were to facilitate the exchange of patents and technical know-how and to impose far-reaching and long-lived standards. To this day, are still used the screw-type socket —devised by Thomas Edison back in 1880 and designated E26/E27 — thanks to the cartel. Most significantly for consumers, Phoebus expended considerable technical effort into engineering a shorter-lived light bulb (Berz, Höge, & Krajewski, 2011).

It wasn’t just a matter of making an inferior or sloppy product; anybody could have done that. But to create one that reliably failed after an agreed-upon 1,000 hours took some doing over a number of years. The household light bulb in 1924 was already technologically sophisticated: The light yield was considerable; the burning time was easily 2,500 hours or more. By striving for something less, the cartel would systematically reverse decades of progress. The details of this effort have been very slow to emerge. Some facts came to light in the 1940s, when the U.S. government investigated GE and a number of its business partners for anticompetitive practices. Others were uncovered more recently, when the German journalist Helmut Höge delved into the corporate archives of Osram in Berlin. Jointly founded in 1920 by three German companies, Osram remains one of the world’s leading makers of all kinds of lighting, including state-of-the-art LEDs. In the archives, were found meticulous correspondence between the cartel’s factories and laboratories, which were researching how to

modify the filament and other measures to shorten the life span of their bulbs (Krajewski, 2014).

Each factory bound by the cartel agreement—and there were hundreds, including GE’s numerous licensees throughout the world—had to regularly send samples of its bulbs to a central testing laboratory in Switzerland. There, the bulbs were thoroughly vetted against cartel standards. If any factory submitted bulbs lasting longer or shorter than the regulated life span for its type, the factory was obliged to pay a fine. Companies were also fined for exceeding their sales quotas, which were constantly being adjusted. In 1927, for example, Tokyo Electric noted in a memo to the cartel that after shortening the lives of its vacuum and gas-filled light bulbs, sales had jumped fivefold. But the Japanese partners were dissatisfied with the fine applied and discouraged to be part of the cartel. (Berz, Höge, & Krajewski, 2011).

There were continual reports of cartel members’ attempts to restore the burning time of their bulbs to the old levels in defiance of the watchful eyes of Phoebus. At one point, some members surreptitiously introduced longer-lived bulbs by designing them to run at a voltage higher than the standard line voltage. After the Phoebus development department’s customary report of voltage statistics revealed such product “enhancements,” Anton Philips, head of Philips, complained to an executive at International General Electric: “This, you will agree with me, is a very dangerous practice and is having a most detrimental influence on the total turnover of the Phoebus Parties”. After the very “strenuous efforts we made to emerge from a period of long life lamps, it is of the greatest importance that we do not sink back into the same mire by paying no attention to voltages and supplying lamps that will have a very prolonged life.”(Burghart, Muller, & Hanseder, 2006) and (Berz, Höge, & Krajewski, 2011).

Over the course of nearly a decade, the cartel succeeded in this quest. The average life of a standard reference light bulb produced in dozens of Phoebus members’ factories dropped by a third between 1926 and fiscal year 1933–34, from 1,800 hours to just 1,205 hours. At that point, no factory was producing bulbs lasting more than 1,500 hours. Of course, given the collective ingenuity of the cartel’s engineers and scientists, it should have been possible to design a light bulb that was both bright and long-lived. But such a product would have interfered with members’ desire to sell more bulbs. And sell more bulbs they did, at least initially. In fiscal year 1926–27, for instance, the cartel sold 335.7 million light bulbs worldwide; four years later, sales had climbed to 420.8 million. What’s more, despite the fact that the actual costs of manufacturing were dropping, the cartel maintained more or less stable prices and therefore higher profit margins. From its inception until the end of 1930, the cartel

retained its overwhelming share of a growing market. But the good times would not last. (Berz, Höge, & Krajewski, 2011).

As the cartel continued its policy of artificially elevated prices, competitors spotted a golden opportunity to sell cheaper, if often inferior-quality, goods. Particularly threatening was the flood of inexpensive bulbs from Japan. Although Tokyo Electric was a cartel member, it had no control over the hundreds of smaller, family-owned workshops that produced bulbs almost entirely by hand. Japanese consumers apparently preferred the higher-quality products sold by the larger manufacturers, and so the majority of these cheap, handmade bulbs were exported to the United States, Europe, and elsewhere, where they sold for a fraction of the price of a Phoebus bulb and well below the average production cost of a cartel bulb, too. From 1922 to 1933, Japan's annual output of incandescent bulbs grew from 45 million to 300 million. (Berz, Höge, & Krajewski, 2011).

Powerful and influential though it was, the Phoebus cartel was short-lived. Within six years of its formation, the cartel was already starting to struggle. Between 1930 and 1933, its sales volume dropped by more than 20 percent—even as the overall market for lighting was growing. The cartel was also weakened by the expiration of GE's basic light bulb patents in 1929, 1930, and 1933, by occasional conflicts among its members, and by legal attacks, particularly in the United States. What ultimately killed Phoebus, however, was World War II. As the members' host countries went to war, close coordination became impossible. The cartel's 1924 agreement, which was supposed to last until 1955, was nullified in 1940. (Krajewski, 2014)

2.1.2 DuPont

In the United States at the end of the 1930s women's nylon stockings became an innovative product of great utility, which through a series of coherent marketing strategies, made them an indispensable feminine accessory. The American chemistry company Du Pont de Nemours is famous all over the world for the discovery of nylon fabric and other materials and components such as Neoprene, Teflon, Kevlar or Lycra. Charles Stine, vice president of DuPont, unveiled the discovery in 1939 at the New York World's Fair, introducing nylon in its textile form to a group of three thousand women, rather than bringing together the scientific society of the time. In the 1940s, DuPont launched the first nylon stockings on the market. Product that met a great success and whose solidity allowed the women of the time to keep

them for months. At the end of the same year it was sold to the general public, causing excitement and the avid interest of the consumers - 64 million socks sold in just one year (Reperio Revista de Arte, 2013).

The low quality of this accessory in its early design and its lack of availability provided by DuPont did not satisfy the female public. Despite the efforts of the company to find a solution to consumer's claims, circumstances related with the product availability were partially solved when the Second World War stopped commercialization and redirected them toward military objectives. DuPont started to cooperate in the achievement of military goals and applied the knowledge it had treasured about nylon fibre to develop stronger derivatives, reaching positive results that allowed the material to be used in war as a fundamental part of parachutes, bags that carried explosives, tyres and even rope to tow car bodies. Largely due to scientific progresses made during the war, this raw material used for female stockings, reached very high standards and until the end of the 40s were coherently transposed into the market, making available a quality and durable product for female consumers. The nature of nylon justified that the product could be used for long periods of time and this troubled DuPont and other companies that had entered into the same market. Gradually, the quality of stocking diminished. As consumer's associations of this product argued, in the United States demonstrations evolved against what they understood as business behavior of "social insensitivity" because they were not providing fair conditions for a useful product for women. This resulted in significant media pressure toward DuPont, and they were directed to increase, among other things, the quality until they were able to offer a similar product to the one previously supplied in the post-war period (Pineda & Salmoral, 2017).

The Company and its competitors disregarded those vindications and continued to modify considerably nylon conditions. They argued that the main reason for explaining the increasing reduction of stockings quality was transparency, which was also a quality demanded by women, and was also considered fundamental in nylon stockings.

This was because before this advances the product was unappealing, lacking style, normally dark and opaque. This solidity finally jeopardized the economic activity of the product - as sales began to stagnate. The original formula of the nylon stocking was then revised, in particular by reducing the amounts of protective additives of the fabric against the ultraviolet rays of the sun, in order to reduce the strength of the stockings and to push the consumers to buy new products (Obsolesce -programée.fr, 2018).

Potential planned obsolescence has not been completely substantiated until today, such as it occurred with the Phoebus cartel, due to the existence of a memorandum that contained

its agreements. DuPont engineers have been the ones who have exposed in the post-war period, the conditions imposed upon them by the company to obtain a more fragile product. (Pineda & Salmoral, 2017)

2.1.3 Recent History of Planned Obsolescence

The recent history shows that the major manufacturers of mobile phones and even printers have been using the technology itself against consumers. Or in favor of themselves, as is the case of Apple, Samsung, HP and Epson for example. The US tech giant Apple and Japanese printer maker Epson face growing legal pressure in France over alleged planned obsolescence in their products as consumer groups make use of the country's law against the practice. The association Stop Planned Obsolescence (HOP or Halte à l'Obsolescence Programmée) filed a complaint against Apple after the company admitted to intentionally slowing down its iPhones as they age. HOP has already filed a legal complaint against printer manufacturers Canon, HP, Brother and Epson, claiming that their devices forced users to change their ink cartridges before they were empty. Apple in the USA has been subject to several class actions since 2010, at least. In the French case, Apple apologized customers in a website post and pledged to update its iOS operating system to let users see whether their battery is in poor health. The company also promised to cut the price of an out-of-warranty battery replacement from \$79 to \$29 for an iPhone 6. To tackle the problem, France passed landmark legislation in 2015, known as "Hamon's law", which made the practice illegal. (Europost.com, 2018).

In Italy, the antitrust organization has launched two separate investigations against Apple and Samsung over accusations of planned obsolescence. The Autorità Garante della Concorrenza e del Mercato, or AGCM, is trying to determine whether the two popular smartphone manufacturers are using software updates to slow down devices in order to influence customers to upgrade their phones. According to the group, Apple and Samsung may not offer enough information to consumers as to the effects of software updates, and don't offer details as to how installing them may slow down devices, which it says could violate several articles of Italy's consumer protection code (Gartenberg, 2018).

Since Apple launched in 2001 of its popular iPod, many other circumstances in relation with this company and the addition of planned obsolescence to its products have been received with criticism by a considerable number of consumers and it has raised questions about its

legality from the point of view of consumers, competition and environmental laws. Despite of the popular disagreement caused by many strategies implemented by the former company, in a very few of these occasions consumer's reactions has been decisive. Those that criticize Apple have been exposed in many more cases than they would like and even when those practices have been evident and clearly directed to take obsolescence one step further, consumers have accepted and tolerated them. In fact, in some instances consumers have defended planned obsolescence too. This is Apple's greater achievement in relation with development as it has convinced private parties, aware of obsolescence, that this is a viable tactic despite being contrary to their interests (Pineda & Salmoral, 2017).

In this sense, the protection of the strategy that seems to be strengthening each day is not only due to Apple's organization and disposition but also thanks to the transformation of consumers' pattern of consumption. This, in return, is favored by the existence of products such as those produced by the former company and the speed at which they are launched. The obsolescence that deals with stylish issues has increased and the product's technological conditions, characteristics and functions have been said– lined and reduced to an issue of natural evolution; that is when products are not just bought to fulfill functions but also to achieve social acceptance and social kudos. This shows that Apple has taken planned obsolescence to a new, innovative level. The company has been taken decisions since 2001 that makes it a major figure of an oligopolistic structure due to its increasing economic and sartorial power (Pineda & Salmoral, 2017).

Despite all the controversy surrounding the news and consumer understanding of what planned obsolescence would be, Apple, for example, continues to grow and generate profit year after year. Samsung, another accused of obsolescence, remains the world's leading mobile phone vendor. There are also consumers who defend the brands and who understand that the aging process of the phones is natural and that the operating systems do not support any more updates.

In Brazil, despite the disclosure on television news and the internet about the cases of programmed obsolescence in Europe and the United States, many consumers do not understand what planned obsolescence could be and although there is an explanation on the subject, most people do not believe is being harmed by the fact that their phone loses features over time. The behavioral aspects of the consumption of Brazilian population in relation to the planned obsolescence will be discussed later.

2.2 PLANNED OBSOLESCENCE: CONCEPTS AND CLASSIFICATION

2.2.1 Concepts

The classical definition of Planned Obsolescence is the production of goods with uneconomically short useful lives so that customers will have to make repeat purchases. However, rational customers will pay for only the present value of the future services of a product. Therefore, profit maximization seemingly implies producing any given flow of services as cheaply as possible, with production involving efficient useful lives (Bulow, 1986).

Most recently and simple understanding, 'Planned obsolescence' refers to the planned premature breakdown of products due to wear and tear that would theoretically be capable of functioning for much longer (Kreiss, 2014). Under planned obsolescence is understood that: the targeted, undisclosed reduction of the useful life of a product by the manufacturer, with the aim of triggering earlier replacement purchases by the customer. It is one form of hidden product deterioration. Another aspect of planned obsolescence is to make products more difficult or impossible to repair. Examples of this include the use of non-replaceable rechargeable batteries in electrical appliances, reduced availability of spare parts, increasing the cost of spare parts, service and maintenance, or deliberately designed incompatibility (Heckl, 2013). These measures can lead to repairs becoming uneconomical, instead inciting the consumer to purchase new products (Kreiss, 2014).

It is noteworthy that the consumer's lack of knowledge about the practice of obsolescence is extremely important, according to theorists. Therefore, the goal of obsolescence is to increase repeat purchases by decreasing the life of a product intentionally, but for this, the consumer will not be able to access information in a clear and objective way – in other words, perfect information. Thus, this theory fits the traditional economic theories, where the economic-consumer agent is selfish, rational and the market, in theory, offers the correct information in a transparent way.

The strategy of planned obsolescence only works provided that the reduction in quality or gradual deterioration of the product remains hidden. This matter was highlighted in an article by the journal "Absatzwirtschaft": "How fast may product quality fall without disappointing the purchaser?" (Reischauer, 2011). The risk of damage to a manufacturer's image or reputation is only to be feared if the drop in quality is too large, too obvious or too easily perceptible.

Lack of transparency and information for the customer prior to purchase is thus of particular importance (Kreiss, 2014).

None of this information is usually available to the customer prior to purchase. Key product information is missing when buying in most cases. Thus when purchasing products, customers are not in a position to decide rationally which is the best or the cheapest, since the total costs of ownership over the total life time of the product in most cases is unknown (Kreiss, 2014).

There are also authors who consider planned obsolescence as a practice of exploitation and deception of the consumer who is fragile and sensitive to the rampant consumerist society: One of the negative side effects of the consumer society and the increasing number of consumer goods available to private households is the intransparency of product quality, especially product lifetime. There are many examples (anecdotal evidence) of failing products and premature obsolescence, including electric toothbrushes, washing machines and printers. Often this phenomenon is related to companies profit maximization strategies (planned obsolescence) and consumer protection policy is mobilized to stop this type of exploitation (Kurz, 2015).

It seems to bother more and more consumers and tends to become an obstacle for consumerism. Nobody wants to be fooled permanently or wants to invest significant chunks of lifetime for investigating producers' quality promises. In some contrast to popular media contributions and publications, with Schridde (2014) and Slade (2006), there are only few empirical studies and hard facts which prove the significance of premature obsolescence (Prakash *et al.*, 2015).

As Schumpeter (1911) already pointed out, the core process of economic development is innovation: new products displace old solutions in a process of "creative destruction". This process is not a zero sum game but creates as a by-product economic growth and wealth. Without innovation the economy would stagnate. Obsolescence is just the other side of the innovation coin. New products "destroy" the old ones which are outperformed. And although they have no technical defect, they will be replaced by the new ones. The more innovative (and wealthy) an economy becomes, the more economic obsolescence accelerates (Kurz, 2015).

Planned obsolescence arises from business decisions which are continuously evolving and adding new instruments, which make the strategy riskier and more transcendent. Science and technology have been acknowledged as natural allies of business' sectors, since their dynamic evolution have contributed to make more complex the task of identifying the elements that favor the creation of a intricate conceptual framework for planned obsolescence. That explains why planned obsolescence can be understood in a broad sense as a production strategy

enforced by companies through which they plan and control a product's lifespan, trying to "dominate" consumption's interests and promote product's dynamic replacement. Thus, through a controlled expiration unilaterally determined by the producer, the company can decide from the design stage to the value chain in which specific moment the product will become either become sufficiently impaired, useless or, at worst, obsolete. In this way, given the existing restrictions to repair and other policies of similar impact, consumers will have to buy a new one. In practical terms, this business practice seeks to ensure consumers will access the market again to acquire a similar product, one which has been updated and renewed with the similar functions to the model they perceived to be obsolete (Pineda & Salmoral, 2017).

Accelerated obsolescence has been discussed already during the world economic crisis in the 1930's as one option to stimulate demand: if consumers could be convinced to replace old products by new ones, demand, production and employment would increase – the Keynesian multiplier effect is started. This idea was rediscovered during the economic crisis 2008/09 when in many countries (Germany, France, US) government subsidies for scraping old cars and replacing them by new cars were implemented (Abwrackprämie, cash-for-clunkers, car scraping bonus). These programs intended to stimulate the automobile industry (OEMs) as well as the many (SME) suppliers. As an additional benefit the argument was that the new cars are more fuel-efficient than the old ones (less greenhouse gas emissions) and hence contribute to sustainable development (Kurz, 2015). In Brazil, in the period of the crisis 2008/2009, there was also a reduction in the tax rate on industrialized products for cars and the so-called "white line" products of larger appliances such as refrigerator, stove, microwave and freezer, which historically have as main purpose meet the basic needs of a residence, with the purpose of stimulating the sale and heating the economy. Between 2009 and 2013 the incentives to the car totaled R \$ 56.4 billion of Brazilian Reais. Government officials justify car incentives for the positive impact of the industry's expansion in the economy, in addition to jobs. The sector accounted for 25% of gross domestic product in 2013. The economic stimulus effect works – at least temporarily. To start the multiplier this is sufficient even if a period of weak demand in the automobile industry follows. But this specific form of stimulating the economy in a crisis seems to be very cost inefficient (Gayer & Parker, 2013). Moreover, stimulating consumption could support a reduction of the saving rate – and thus have a negative effect on long-term economic growth (Kurz, 2015).

2.2.2 Classification

Planned obsolescence is known or recognized only as the strategy of reducing the life span of a good in order to make it stop working. In most industries, the product life cycle determines the shelf life of a product and thus, the practical application of obsolescence, however, the obsolescence can be planned in several ways, so it is possible to classify it.

Piñeda and Salmoral (2007) classify Planned Obsolescence in five types: style subjective obsolescence, technical objective obsolescence, functional objective obsolescence, computing objective obsolescence, notification objective obsolescence.

Style subjective obsolescence

The appearance and impact of a product can encourage consumption (Maycroft, 2009). This is the reason why different markets are constrained by business decisions to structure of cycles. New forms and new designs are introduced, in order to lead consumers towards a new style and, as a consequence, the disappearance of its predecessor (Del Maestro - 2012, Gonzalez and Malbarex -2011). In some sectors, this process is favored by the creation of a custom to present products' new models in a certain periods of the year. An example can be seen in the clothing fashion industry and its autumn/winter or spring/summer catwalks, as well as in the automobile industry, the mobile phone, or the technological equivalent, where companies like Apple launch products always in the same time of the year. Through marketing strategies, this dynamic allows companies to provoke disconformities among consumers, introducing changes with respect of the previous product. Those changes can be relevant to the product's functioning or purely esthetical. The aim of these strategies is to make consumers feel detached from their old products, and desire to buy new products with the same characteristics but with a "newer wrapping". This conduct shows a clear manifestation of planned obsolescence, as it causes a sense of private inadequacy in individuals and the feeling of owning and old- fashioned (Guiltinan, 2004) products, that have to be replaced by more recent ones, with which they would feel more comfortable and even facilitates their socialization (Maycroft, 2009). Companies have increased this initiative and have taken it further, reviving extinguished trends, converting them into cyclic or adding new ones with a restricted temporal acceptance that is in return supported in low-quality products that endure as long as the proposed fashion. This said, these behaviors increase the dissatisfaction consumers already feel, whatever its nature. Social classes allow consumers to have a defined

target, which is the one that delimit the timing in style obsolescence; since products are introduced firstly in higher social classes and then, they are presented to the remaining classes with lower incomes. The trend of the product and the product itself decline as the goods reach this lowest type of consumer, setting a clear standard of the design lifecycle and the necessity to implement a new one (Pineda & Salmoral, 2017).

Technical objective obsolescence

This type of obsolescence is created at the initial moment when the product is being designed and it is moved from to the rest of its development stages. Therefore, it is based on the inclusion of the necessary elements to guarantee that the product would fit the lifespan projected by the company. Deciding promptly enough and at the moment the product was being conceived, its duration, companies guarantee raw material and components that will be used in its production will also match the time specifications previously planned. From a business perspective, it is pointless to create a product with components that can last longer than the product (Torresen, Lovland, 2007). Thus, as a result of this type of obsolescence, companies get to know the product duration and implement complementary conducts to reinforce and consolidate obsolescence such as: (i) introducing a system around the product that makes the expenses of the product substitution similar to the reparation fees, Adolphson (2005), McCollough (2007) and Gultinan (2009) (if it is possible); (ii) to make impossible, costly, difficult or even deny the service of assistance or technical assistance to whom have bought the product, once it has reached the life term the company anticipated; and (iii) to cut or interrupt the production or availability of products' pieces, replacement or accessories (Karalias, 2010). This category is being increasingly used by large companies with a particular set of conducts, which fit a type of obsolescence that it is going to be explained in the next sections. Thereafter, more product lines are created and continuously launched, despite serving for the same functions as their predecessors. Moreover, they are incompatible with them. This strategy promotes obsolescence and makes it more agile, and efficient, as it looks for the need to replace a product as soon as possible (Pineda & Salmoral, 2017).

Functional objective obsolescence

The expansive evolution of science and technology has enhanced this category. The dynamism of their advances is of such proportions that allow companies to introduce new

products suited to replace completely the previous ones. As such, the integration of new technologies allows large companies, using the developing concept of obsolescence, to show to the general public the unsuitability of the preceding products to accomplish the functionalities of the current product as well as to speed and shorten products duration and the generational gap existing between them, in order to assist in replacing the previous technology towards its demise and disappearance (Del Mastro, 2012). This type of obsolescence is implemented (Saunders and Jobber, 1994), not only in business planning, but can also be produced when technology has reached a level of evolution that justifies to apply the innovation grasped for markets purposes in the form of new product. Arguments related with the favorable auspices for consumers, the environment, etc., support this kind of approach. A polemic aspect of this form of obsolescence is that, as defended by authors well versed on the matter, this type seems to be more spontaneous. Instead, large companies introduce new products describing them as “innovative” without being so; often causing the retirement of many useful products with total capacity to fulfill their functions. Examples of functional “non planned” obsolescence are, among others, analogical televisions, which has been replaced by modern flat-panel plasmas or DVD players that have substituted VHS. Both examples have proved to improve the quality of the image and sound. Those cases contrast with others in which obsolescence can be interpreted as “forced”, for instance the cases of AC adapters, mobile battery chargers, computers, electronic equipment, etc. In these cases, the companies tell consumers that modifications in those products are justified due to engineering labor when the truth is that in most cases they have as a main aim to render the previous products incompatible with the current ones (Del Maestro, 2012).

Computing objective obsolescence

This type of obsolescence has two sides that need to be distinguished. Both are based on the creation of computing modifications and by company's removal, of the required conditions for the product continuous use and its function (Cassia, 2007). Thus, this category is produced: (i) when software is pushed to disuse due to the appearance of a new one with which is not compatible, and (ii) when it is pressed to modify the performance of hardware because of the evolution of the supporting software. The first circumstance is normally the most frequent in those cases in which software is commercialized with the impossibility of having the tasks it performs edited by its predecessors. In this way, consumers are encouraged to acquire the last and therefore latest version. This dynamic conversely is possible as in all

opportunities the new software has the opening and edition of files coming from previous operative versions (Hindle, 2008). This eventuality within obsolescence that is based on computing matters is often accompanied with the cancellation by the software supplier assistance and technical service in the company which thus on progressively produces its disappearance. The second circumstance normally occurs in more abrupt sudden way since by means of the currently common systems' updates, the performance of the hardware is modified and negatively affects and progressively the software speed and quality. Therefore, it causes in the product's owner a feeling of frustration and the perception of owning an old system. In fact, it would have maintained its speed, quality and performance conditions if the update had not taken place. These modification packages that are said to be structured to make the product "more modern" in most cases diminish its productivity, functionality, and utility (Sandborn, 2007, Bashir, 2000, & Downson, 1997).

Notification objective obsolescence

This category is based on a business behavior that consists on producers informing consumers about the duration of the product when they buy it. In addition, they inform consumers when the product should be replaced by a new one. The nature of certain products favor how private parties get to know, by first hand, the producer's suggestions regarding the period of time during which the product will have capacity to fulfill its operations. Being the basic examples of this category are printer ink cartridges that inform a system that they cannot longer serve for their task. Another is razor blades for which once their gel layer acquires a specific shade, business practices invite to discard them. Albeit it is possible to differentiate modalities of planned obsolescence, it is also pertinent to add that nowadays it is most often for them to be jointly put in practice by business. That is, they are compatible with each other and they have the same objective, so this favors producers which choose the elements of each of them, that given a product characteristic, its market and economic conditions, etc., will benefit them the most. Since its first appearance as a business strategy, obsolescence has always looked for causing fluent economic movements and has been as well as still is currently defended by many as the main engine for consumption practices. This is the reason why it turns out to be essential to know what the factual circumstances which relate to practice are. (Pineda & Salmoral, 2017)

Packard (1960), in the work paper "The Waste Makers" distinguished Planned Obsolescence of Function, quality and desirability. As an Obsolescence of function , Packard

conceptualizes: “ a situation in which an existing product becomes outmoded when a product is introduced that performs the function better. The obsolescence of quality is the deliberate intent a product breaks down or wears out at a given time, usually not too distant. And obsolescence of desirability, when a product that is still sound in terms of quality or performance becomes “worn out” in our minds because of styling or other change makes it seem less desirable

Cooper (2004) split Planned Obsolescence in Absolute Obsolescence and Relative Obsolescence: absolute obsolescence arises from product failure while relative obsolescence resulting from a consumer’s decision to replace a functional product. Relative obsolescence thus occurs in three domains, which may be expressed as mind, money and matter. According to Cooper, the absolute planned obsolescence can be divided into: economic obsolescence, psychological obsolescence and technological obsolescence.

Economic Obsolescence

This kind of obsolescence occurs when a consumer attributes little or no value to an existing appliance and concludes that it is no longer worth keeping in use. It presents itself through low performance/cost ratio, reduced value, excess cost of repair relative to replacement, price trends caused by market structure. They might be influenced by cost of new replacement models, which may be more energy-efficient and cheaper to maintain, or by the expense of repair work. As for the format, economic obsolescence, may be financial outlay, value, depreciation.

Psychological obsolescence

This kind of obsolescence which occurs when people are no longer attracted to a product or satisfied by it. Originated from a subjective change in the user’s perception of a product and is associated with status achievement. The sources of psychological obsolescence are changes in perceived need, trends in design (style, fashion), desire for social status (emulation), and marketing. The form: desire of attractiveness (aesthetic, functional or symbolic value), user satisfaction.

Technological obsolescence

The origin of this kind of obsolescence arises when people are attracted to functions in newer models added or changed as a result of advances in knowledge. It's represented by form: functional change, quality, effectiveness. Source: innovation through new knowledge, reduced environmental impact information or communication capability.

2.3 HEURISTICS AND COGNITIVE BIASES

In 1974, Daniel Kahneman and Amos Tversky wrote an article in *Science* titled "Judgment under Uncertainty: Heuristics and Biases" and in 1982 a book with the same title became *Heuristics and Biases*. The focus of these publications was heuristic principles that created shortcuts to probability judgments. The authors argued that many decisions are based on beliefs constructed about facts and / or processes that are not known with certainty. Faced with situations like these, people make use of simple rules that reduce the complexity of decisions. For them, "In general, these heuristics are wholly useful, but sometimes they lead to serious and systematic errors" (Tversky & Kahneman, 1974).

Cognitive biases are mental and emotional filters, in which the individual relies, to understand and respond to external events. They undermine an individual's ability to evaluate information objectively and logically (Tversky & Kahneman, 1974).

Heuristics are "shortcuts" that the human brain traverses for decision making, transforming complex questions into simple questions (Tversky & Kahneman, 1974). The heuristic of the halo effect causes an individual, by identifying a quality in someone, for example, to overestimate other qualities that he, in fact, may or may not have (Kahneman, 2011).

This was the beginning of work on the research program that Tversky & Kahneman started to develop and called *heuristics and biases approach* (Tversky & Kahneman, 1974). The perception of the systematic occurrence of behaviors that deviate from those postulated by the already widely known "truths", which respect established laws of science, is the inspiration of the authors' research. For Tversky and Kahneman (1974), recurrently, decision makers use simple rules that eventually result in deviations. They have developed the study of these heuristics as a way of finding elements that help to understand human decisions. This approach gradually gained importance in economic research and began to bring together authors from different perspectives. Tversky and Kahneman (1974) sought empirical grounding through several experiments, in which the existence of deviations of behavior is perceived. The method

used by the authors involves the observation of recurrent elements, the basis for the specification of attributes that influence the decisions and for the verification of the occurrence of effects that depart the decisions of those that would be obtained according to the Theory of Expected Utility. There are many experiments carried out by Tversky and Kahneman (Sbicca, 2010).

Heuristics are also known as rule of thumbs, which are rules pre-established by an individual's brain for decision making. (Moran & Montero, 2014). Both cognitive biases and heuristics are provoked in the "system 1" of the human brain. (Morewedg & Kahneman, 2010). "System 1" is fast, intuitive, automatic, instinctive, and emotional. The other system that makes up the human brain, the "system 2", on the other hand, is slow, logical, rational, and significantly lazy, as well as consuming a lot of brain energy in processing thoughts. (Morewedge & Kahneman, 2010). For these reasons, "system 1" is responsible, in most cases, for decision making. Because it is a decision based on cognitive and heuristic biases, decisions are sometimes useful, and at other times lead to serious and systematic errors. (Tversky & Kahneman, 1974).

System 1 can also be described as the most primitive areas of the human brain (the reptilian system and the limbic system), which has been slowly evolving since our earliest ancestors. (Mortin, 2011). Even today, humans' "ancestral brain" often processes and makes decisions in the same way that our earliest savannah ancestors took, more than 4 million years ago. (Camargo, 2010). The cognitive bias of the present, in which the human brain prioritizes the certainty of the present to the detriment of the uncertainty of the future, is an example: in the struggle for survival in the African savannah, our ancestors worried about how to survive in the short term, happen in the future. For them "today" was more important than "tomorrow". Together, cognitive and heuristic biases form the basis of behavioral economics, which studies how an individual effectively makes a decision, according to his own preferences and beliefs, influenced by cognitive and heuristic biases. (Thaler, 1979, Kahleneman, & Tversky, 1983). Behavioral economics has its origin in the concept of bounded rationality, proposed by Simon (1957), in which an individual can not maximize his utility by having a limited mental processing capacity (limited rationality). In this way, an individual can allocate only a small number of answers, in front of the numerous decision options that compete with each other (Foxall & Sigurdsson, 2013). It makes decisions, ignoring certain aspects of the decision-making process because it does not consider all alternatives or because it comes to the wrong conclusions based on the information available (Hanoach, 2002). The individual does not realize what relevant information is missing, which leads to misjudgments. (Kardan & Kalyanaram,

1992). This idea is synthesized by Kahneman (2011), with the expression "What you see is all there is" (Avanzi, 2016).

2.4 THE BANDWAGON EFFECT

There are innumerable social and economic situations in which people are influenced in their decision making by what others around them are doing. Perhaps the commonest examples are from everyday life: people often decide on what stores and restaurants to patronize or what schools to attend on the basis of how popular they seem to be (Banerjee, 1992).

Herd behavior, is the tendency for individuals to mimic the actions (rational or irrational) of a larger group. Individually, however, most people would not necessarily make the same choice. The bandwagon effect is a psychological phenomenon in which people do something primarily because other people are doing it, regardless of their own beliefs, which they may ignore or override. The bandwagon effect has wide implications, but is commonly seen in politics and consumer behavior. This phenomenon can also be seen during bull markets and the growth of asset bubbles. (Investopedia, 2018).

This effect is evident when people do what others are doing instead of using their own information or making independent decisions. The idea of herding has a long history in philosophy and crowd psychology. It is particularly relevant in the domain of finance, where it has been discussed in relation to the collective irrationality of investors, including stock market bubbles (Banerjee, 1992). In other areas of decision making, such as politics, science, and popular culture, herd behavior is sometimes referred to as 'information cascades' (Bikhchandi, Hirschleifer, & Welch, 1992). In the early 1980s, several researchers conducted studies based on the original work of Bourne (1957), which focused on the influence of reference groups on the consumption of prestige brands (Mason 1981, 1992; Bearden, & Etzel, 1982). These authors found that the conspicuousness of a product was positively related to its susceptibility to reference-group influence. For instance, Bearden and Etzel (1982) concluded that publicly consumed luxury products were more likely to be conspicuous products than privately consumed luxury products. Conspicuous consumption still plays a significant part in shaping preferences for many products which are purchased or consumed in public contexts (Braun & Wicklund, 1989; Hong & Zinkhan, 1995; Bagwell & Bernheim, 1996; Corneo & Jeanne, 1997). Thorstein Veblen (1899) many years ago suggested that conspicuous consumption was

used by people to signal wealth and, by inference power and status. Thus, the utility of prestige products may be to display wealth and power and one could consider that highly visible prestige brands would dominate the conspicuous segment of the consumers.

Leibenstein (1950) called the effect which influences the lower-end brand extension, the bandwagon effect. The bandwagon effect may be conceptualized as the antecedent of the snob effect (Rogers, 1983; Miller, McIntyre & Mantrala, 1993; Berry, 1994). "Even though snobs and followers buy luxury products for apparently opposite reasons, their basic motivation is really the same; whether through differentiation or group affiliation, they want to enhance their self-concept" (Dubois & Duquesne, 1993b). Belk's (1988) notion of extended self may be useful to interpret the prestige value which encourages a bandwagon effect. People's desire to possess prestige brands may serve as a symbolic marker of group membership. It is proposed that, the bandwagon effect influences an individual to conform to prestige groups and/or to be distinguished from non-prestige reference groups (French & Raven, 1959; Sirgy, 1982; Midgley, 1983; Solomon, 1983; Mick, 1986; McCracken, 1986; Belk, 1988; Dittmar, 1994). That is, individuals buy to feel part of a group, to feel accepted. This phenomenon is also called a sense of belonging. The contribution of reference theory in the analysis of prestige consumer behavior appears to be the central motivation underlining prestige consumption. Multiple reference groups refer to the problem of being under pressures and demands of one's own membership group, and attracted by the standard dictated by another reference group (Hyman, 1942; Holt, 1995). Research has originally demonstrated that people tended to conform to the majority opinion of their membership groups when forming attitudes (Festinger, 1954). Hence, a person may use a prestige brand during the week, to conform with their professional position, and use a modest brand during the weekend, to match social standards of his/her neighborhood. Thus, bandwagon consumers may use the perceived extended-self value of prestige brands to enhance their self-concept. Following Kelman's (1961) theory of opinion change, it is proposed that the presence or absence of the referent may affect the behavior of the prestige-seeker within a spectrum of no effect (internalization) to total effect (compliance). It is observed that the herd effect is not present only in the luxury market or in the decision of purchases made by the consumer of high purchasing standard. This effect is also found in consumers of the most popular brands, which often mimic the high-end brands.

Recent research demonstrates that consumers often use television to learn about affluent lifestyles (O'Guinn & Shrum, 1997), and then try to imitate stereotypes of affluence by consuming similar prestige products (Dittmar, 1994). O'Guinn and Shrum (1997) examined the consumers' use of television to construct social reality. Their study identified that the

prevalence of products and activities associated with an affluent lifestyle were positively related to the level of exposure to television. In addition, Hirschman (1988) analyzed the impact of television shows such as "Dallas" and "Dynasty" on consumers' orientation and ideology. The results revealed that viewers used the information on affluent lifestyle portrayed in these programs to project their own ideology and orientation. Holt (1998) applied Bourdieu's theory (1984) relating levels of cultural capital to consumption patterns to the contemporary US. His analysis suggested that, in the contemporary US, mass rather than high culture structured patterns of taste, and that consumption continued to serve as an effective element for the reproduction of social class. Consequently, both the consumption of "high" as opposed to "mass" culture interdependently contribute to the construction of prestige; high cultural capital emulating mass cultural capital, and inversely. (Johnson & Vigneron, 1999). In recent years, the term "opinion makers" has become widespread in the media and in people's daily lives. With the expansion of the worldwide computer network and popularisation it accesses, websites and blogs have multiplied. The term "blogger" has become popular in Brazil and there are those who make this neologism a profession. Companies seek these people to advertise their products and influence the decision of the consumer. The logic is simple, the more "I like" appears in the pages of your blogs or social networks, the greater the likelihood of your product of being spread and bought. Online media has also invested in group representation. There are groups of gays, feminists, blacks, religious, and so on. There are influencers in these categories who bring thousands of people together.

2.4.1 The Bandwagon effect and psychological obsolescence

The bandwagon effect can also exert an influence in the decision making of purchase of mobiles. As is has seen, the perception of psychological obsolescence is directly related to social pressure, fashion and marketing. By definition this cognitive bias is the psychological phenomenon in which people make decisions based on the decisions of others, because most do take a determined decision.

When a particular famous person releases a product, or when a brand that denotes prestige and fame launches a new product on the market, the consumer who wants to be part of this "exclusive" group buys by the impulse, psychological need to feel part of this universe. On the other hand, people who are part of a particular religious group, or associations are more likely to shop for a particular brand or product because their fellows also do. And yet, they are

influenced by online advertisements. Today with the almost instantaneous diffusion of information, the more the product is evaluated, the greater the propensity of a particular individual to buy it, not only for reliability, but also for status. In classical Economics, Bandwagon effect is an example of a positive network externality in which the quantity demanded of a good that an individual buys increases in response to the increase in the quantity purchased by other individuals. Thus, more the number of people the consumers find have bought the good, the greater the demand for the good in question and further to the right demand curve for the good lies. (Economics discussion.net, 2018)

In summary, is possible theoretically see a positive relationship between the cognitive bias Bandwagon effect and the perception of psychological obsolescence, which leads the consumer to make the decision to buy a mobile phone.

2.5 OPTIMISM BIAS

People tend to overestimate the probability of positive events and underestimate the probability of negative events, a phenomenon known as optimism bias. For example, they may underestimate their risk of being in a car accident or getting cancer relative to other people. A number of factors can explain unrealistic optimism, including self-serving biases, perceived control, being in a good mood, etc. A possible cognitive factor that has been identified in optimism bias is the representativeness heuristic (Shepperd, Carroll, Grace, & Terry, 2002). Representativeness is one of the major general purpose heuristics, along with availability and affect, and it is used when they judge the probability that an object or event A belongs to class B by looking at the degree to which A resembles B. When they do this, they neglect information about the general probability of B occurring (its base rate) (Kahneman & Tversky, 1972). In general, the Brazilian people as a whole are known as "optimistic", "cheerful", "positive" and full of good mood. Although there are many self-help beliefs, publications and religions that preach the change of mentality through the practice of optimism, studies show that optimism may be a cognitive deficiency that is not present in everyone in a population. Many describe this well-known effect of Behavioral Economics as the perception that there is a greater likelihood of events having positive, more useful results - in other words, an "optimism" about the future (Gohmann, 2016).

The bias of optimism can then be linked to a popular belief that generates in the individual of a particular population trace of irresponsibility in the fact of not thinking about

the future or exclude the possibility of event of negative facts like illness, death, unemployment and even tragedies natural. Compulsively spending, or spending without resources, i.e. taking on a debt without resources simply based on the feeling that "tomorrow is another day and will be better than today" is a negative aspect of the bias of optimism.

The bias of optimism is not found uniformly in all people. In *Depressive Symptoms Associated with Unrealistic Negative Predictions of Future Life Events* (2006), Strunk, Lopez and DeRubeis found that "optimistic bias was not significant in the participants with low depressive symptoms, whereas the pessimistic bias was significant in participants with elevated depression symptoms". Therefore, they could conclude that differences in observed optimism seem to relate to how a Controlling Mental Process works as yet unspecified. Sharot, Korn, and Dolan (2011) postulated a direct link between "unrealistic" optimism and physiology and concluded: "[...] optimism is tied to a selective deficiency of update and reduced neural coding of neural information concerning the future." They conclude on the basis of these studies and others that individual differences occur on the Optimism Bias, that is, not all behave similarly as a result of this bias, and some preexisting process or state "directs" it (Gohmann, 2016).

2.5.1 The Optimism bias and Economic obsolescence

The perception of economic obsolescence manifests itself through the evaluation of the consumer that the good that it already has is not worth the cost of maintaining it, instead it would be more advantageous to buy a new good. It can manifest because of low performance/cost ratio - The cost performance ratio is defined as a product's ability to deliver performance at its particular price. In general products with a higher cost performance ratio are more desirable, provided all other factors remain the same (www.cornelsen, 2018).

Numerous are the cognitive possibilities that can lead the individual to this conclusion, but the individual imbued with the desire for exchange should undoubtedly assess whether his need to exchange the apparatus is in accordance with his financial possibilities and what would be the best moment, in economic terms. The cognitive bias of optimism - one that causes the individual to believe that the likelihood of bad things happening to him is less than the probability of bad things happening to the neighbor, relative or co-worker, causes the consumer to disregard events such as unemployment, economic crises, corporate bankruptcy and even death. This individual generally prefers to buy a good than to take out insurance or join private pension program.

2.6 PRESENT BIAS

The present bias refers to the tendency of people to give stronger weight to payoffs that are closer to the present time when considering trade-offs between two future moments. People are impatient—they like to experience rewards soon and to delay costs until later. Economists almost always capture impatience by assuming that people discount streams of utility over time exponentially. Such preferences are time-consistent: A person's relative preference for well-being at an earlier date over a later date is the same no matter when she is asked. Casual observation, introspection, and psychological research all suggest that the assumption of time consistency is importantly wrong.' It ignores the human tendency to grab immediate rewards and to avoid immediate costs in a way that our "long-run selves" do not appreciate. They call such tendencies present-biased preferences: When considering trade-offs between two future moments, present-biased preferences give stronger relative weight to the earlier moment as it gets closer" (O'Donoghue, & Rabin, 1999).

2.6.1 Present bias and Technological Obsolescence

For individuals who are influenced by the bias of the present, they perceive technological obsolescence very clearly. There is no doubt between buying today the long-awaited new product just launched or waiting for six months to buy it at a lower price. The emotional reward for having the product so expected today is greater than the possibility of waiting a while to get the same good, for a lower value.

Interestingly, Cooper reports that while a majority of consumers express a strong perception of declining durability, only a minority blames manufacturers for this outcome. This minority, in turn, mostly focuses on producers' intentional reduction of product lifespan via either decreased reliability or continual product updates (Cooper, 2004). Apparently, consumers adapt to this imbalance between high durability expectations and low performance by lowering their product-lifespan expectations (Evans & Cooper, 2010), thus reducing the resulting cognitive dissonance. This finding is consistent with evidence that product durability is not perceived as a problem (Evans & Cooper, 2010) and with the weak role product longevity plays in influencing consumer choice (Cooper, 2004; Cox *et al.*, 2013; Echegaray, 2015).

According to Echegaray (2015), Brazilian consumers have experienced long-time frustration without access to the best electronic goods and now, they are experiencing a new moment of consumption with rapid substitution of products.

Undoubtedly, the spread of the internet in recent years has warmed the Smartphone consumer market. Brazil is one of the countries that has the most internet users, through mobile devices.

2.7 HYPHOTESIS

The traditional theory of consumer behavior is based on two propositions: (1) the consumer chooses the best alternative among the conceivable courses of action open to him, and (2) the primary determinant of consumer expenditures, aside from tastes, is income or, according to more recent formulations, the normal or permanent income of the household (Katona, 1968)

However, advances in behavioral studies show that at the moment of decision making, the human brain takes mental shortcuts and uses shortcuts and mental filters that in the understanding of the individual causes him to make the best decision. It is evident that each individual is a particular universe that transforms every day from interactions with other individuals. They are the product of their culture, their past experiences, the knowledge acquired over the years and their own intuition. For an individual possibly the purchase decision taken at a given time is the best decision of that time $t = 0$, fitting reappraisal and future repentance ($t = 1$, $t = 2$, etc). The hypotheses here related go against the conspiracy theory of planned obsolescence. In the past, factors such as economic monopoly (Bulow, 1986), could force the individual to make repetitive purchases of the same product, allied also to lack of information, since the main premise was to difficult thr access to information regarding the useful life and quality and ensure that the product was not repaired, or that it was difficult to repair. Currently, after studies by Daniel Kahneman, Amos Tversky, Dan Ariely and Richard Taller that highlight the human being as a complex, influenced and influential individual and after technological advances that allow alternative and cheaper brands to be bought and even repaired, as well as advances in legal studies of consumer protection, is proposed that , it is not simply the purposive degeneration of a good that stimulates the individual to consume, but the cognitive biases act in order to create triggers of perception of this deterioration impelling the individual to make the purchase decision. In this sense, are proposed the following hypotheses:

H1 – The Bandwagon Effect positively affects the perception of consumer psychological obsolescence

Psychological obsolescence, also known as symbolic or subjective obsolescence, is defined as a devaluation of product perception based on the need to obtain status, fashion, aesthetics and influence of peers or social groups such as family, friends, or even opinion makers. media such as actors, entrepreneurs, football players, and so on (Echegaray, 2015).

The notion of psychological obsolescence can be related to consumer engagement with goods as a means for establishing identity and engaging socially (Douglas & Isherwood, 1996).

The desire to get status or be part of a group that culminates in the purchase of a certain product that everyone has, or even make the purchase decision because most people do it is the manifestation of the Bandwagon effect.

H2-The Optimism bias positively affect customer's choice in all purchasing decision

Recent report by the Brazilian Institute of Economics - IBRE Getúlio Vargas Foundation - RJ points to a significant increase in the consumer confidence index, which expects to spend more in the coming months. However, maintaining consumer confidence will depend on the non-occurrence of negative political and economic factors (CCI, 2018).

The literary review that points to the bias of optimism as the tendency or inclination to perceive an event or action as more likely to result in a favorable outcome regardless of the objective probability that the outcome actually occurs (Fabre & Heude, 2009).

H2b- The bias of optimism positively affects only the consumer's perception of economic obsolescence.

Economic obsolescence is characterized by the perception of the loss of value of a good, it was defined as the loss of value or the usefulness of a property caused by factors external to the asset. These factors include the increase of the cost of repair, reduction of demand for the product, among others (American Society of Appraisers, 2011). At a time when the consumer thinks it is more advantageous to discard this good rather than repair it, the product becomes obsolete. A typical consumer will not bother analyzing the manufacturer's promised lifetime and doing the depreciation calculations. All that the consumer has is the feeling that their product is not worth being repaired. Perhaps a group of consumers will make a quick analysis of how long you have had the device and what your current state is, how much you will pay for repairing it, and how much a new one costs. But this equation would become sophisticated for a common consumer, since it would have to take into account several concepts, among them, discount to present value, depreciation and abstract concepts such as the current "state" apparatus. All that the consumer has in his hands is the sense of obsolescence and the economic

outlook that he can afford the product he wants. And most of all the idea that you can pay for the product, without major concerns about saving money. This is the presence of the Optimism bias.

H3 - The Present bias positively affects the consumer perception of technological obsolescence

In recent years the number of people who declare themselves interested and very interested in technology and even addicted to it has been increasing. The present work will not discuss the phenomenon of dependence neither the escape from reality, but the emotional trigger that leads these people to consume. As a premise, is proposed that, these individuals who use the technology to: work, entertainment, and everyday life. With the accelerating pace of technological change, technological obsolescence is the main cause of functional obsolescence today. In fact, when technological obsolescence is occurring, it usually overshadows all other causes of obsolescence (Barreca, 1998). The perception of technological obsolescence is not only for personal use products such as a mobile, personal computer or TV. It is also a factor that is considered decisive for the purchase decision regarding to cars, refrigerators and general goods. The technological obsolescence is characterized by the attractiveness that the new goods exert over the behavior of human consumption, resulting from the technological advances. So the highly technology-motivated individual will see his reward in that he can buy it immediately after launch regardless of the amount that will be paid, even if in three or six months he can buy the same for a significantly lower value. This is the logic of the Present Bias.

H4 - Planned obsolescence is a decisive factor for the purchase decision

This was the main idea of the creators of the Phoebus Cartel for example and the classic concept of planned obsolescence, purposeful reduction of the useful life of a good, in order to stimulate the repetitive purchase of it.

3. METHODOLOGY

3.1 MARKET INFORMATION AND CONSUMER PRODUCT PROFILE

The importance of the mobile has grown year after year in Brazil. According to the Brazilian Institute of Geography and Statistics - IBGE, of the population aged 10 and over, 77.1% had mobile for personal use. The indicator varied from 65.1% (North) to 84.6% (Central-West). The proportion of men who had a cell phone for personal use (75.9%) was lower than that of women (78.2%). This difference was noticed in the North (62.3% against

67.8%), Northeast (65.5% against 71.6%) and Central-West (83.6% against 85.6%), but almost imperceptible in the other Regions. Among cell phone users, 78.9% accessed the Internet by means of the device. The percentage of cell phone users (personal use) was lower in the age group of 10 to 13 years old (39.8%), increased in the group of 14 to 17 (70.0%) and reached the greatest levels among persons aged 25 to 34 (88.6%) and 35 to 39 years old (88.2%), then falling in the following groups to reach 60.9% among the elderly (60 years old or older). Among the population aged 10 and over, 22.9% did not have a mobile cell phone for personal use. Among the reason not to, the highlights were: equipment price (25.9%), lack of interest (22.1%), used someone else's cell phone (20.6%) and did not know how to use it (19.6%). Regionally, the major reason ranged from the cost of the device (North and Northeast), someone else's device (South and Central-West) and lack of interest (Southeast). In the North Region, 12.5% said that the service was not available in the places where they hang out, which did not reach 5% in the other Major Regions. (IBGE, 2018)

3.2 RESEARCH METHOD, PROCEDURE AND EXPERIMENTAL METHODOLOGY

From the primitive man, the human being seeks the knowledge. This search causes humanity to begin to think based on their observations evolving their knowledge from ideas about astrology to records on papyri in order to make manifest knowledge. Knowledge has cognitively experienced several phases in which it was based on several types (Fachin, 2003; Ramos & Busnello, 2005).

3.2.1 Research method

The applied research method was the experimental quantitative method. According to Richardson (1989), the quantitative method is characterized by the use of quantification, both in the modalities of information collection, and in the treatment of these through statistical techniques, from the simplest to the most complex. This method is to test the impact of an intervention on a result, controlling all other factors that may influence this result (Creswell, 2010). For this, the method consists of dividing the individuals participating in the study into two groups: control group, in which the intervention is not performed, and the experimental group, in which the intervention is performed. Finally, the results of the two groups are

analyzed, in order to understand if the intervention caused different results in the experimental group, compared to the control group.

3.2.2 Procedure

The procedure of the experimental quantitative methodology adopted was the Post-test-only control group design. This design is fairly simple to implement. Examination of individual cases is often not of interest. On the other hand, this design possesses significant advantages in terms of time, cost and sample size requirements. It involves only two groups and only one measurement per group. Because of its simplicity, the post-test-only control group design is probably the most popular design in marketing research (Malhotra, 2011).

3.2.3 Experimental methodology

The experimental methodology adopted was the laboratory experiment. Due to the nature of economic research, the possibilities of obtaining evidence from the observation of the natural market are limited. In this way, laboratory experiments are presented as a relevant tool for obtaining economic data, as well as for testing behavioral hypotheses. Economists' interest in laboratory methods began, according to Davis and Holt (1993), from the 1940s and 1950s. The pioneer was Edward Chamberlin who, in 1948, conducted with his students market experiments focused on the predictions of neoclassical price theory. Experimental economics thus constitute a relatively recent field in economics. Nevertheless, there is no inherent reason why relevant economic data cannot be obtained through laboratory experiments. On the contrary, laboratory experiments have the advantage of allowing a more direct test of behavioral hypotheses, partially solving the problem with obtaining data for such tests. Other qualities of the laboratory experiments are described by Feltovich (2011): the researcher has substantially more information about the experimental environment than in the field; the control of the experiment in the laboratory allows the researcher to vary the parameters in a systematic way, with ease, and can still collect information that the field researchers do not have access to.

3.3 EXPERIMENT DESIGN

The goal of this experiment was to test whether cognitive biases of: Present Bias, Optimism Bias and Bandwagon effect drive the consumers to perceive the planned obsolescence and consequently if its perception influences consumers purchase decision.

For this purpose, a questionnaire was sent by electronic tool through an application specialized in research – Survey Monkey and in order to validate the experiment, the services of a startup that offers national research services with a database previously registered, that works with control points for data crossing was contracted – Oppion Box. Two questionnaires were created, which were distributed randomly. Those questionnaires were organized in four sections regarding to the association between Planned Obsolescence classification according to Cooper (2004): Perception of Absolute Obsolescence, Perception of Psychological Obsolescence, Perception of Economic Obsolescence and Perception of Technological. In the questionnaire sent to the control group it was created a neutral questionnaire without mentioning data that could influence them or make them think deeply about their decision making. The average time of each respondent for the questionnaire sent to Control Group was four minutes. However, the treatment group received a questionnaire with information intentionally mentioned in order to induce the participants' way of thinking, for the treatment group the mean response time was eight and a half minutes.

The questionnaires were distributed throughout the country, regardless of gender or age. The objective was to obtain a more heterogeneous sample that could represent the opinion of the Brazilian population in general.

The matter for correlation between Cooper (2004) obsolescence classification and the Cognitive Biases chosen is shown on the tables below:

Table 1: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Bias: Psychological Obsolescence x Bandwagon Effect

Psychological Obsolescence	Bandwagon Effect	<p>When a consumer sees a group of people crowding in a shop and out of curiosity, enters the store, sees the offers and ends up buying something unplanned, which this consumer did not need, is a classical example of Bandwagon Effect. The consumer acts in this way to seek the support of a group, having the feeling that he has or has not lost an advantage, such as the discount in a store. It is a way for the individual to feel secure, and that is not alone. If the consumer is left out, it creates the sense that everyone was making money, and that individual was not. On the other hand, if this consumer loses money, he does not lose alone, there is support, security, for doing something together. An artifice often used by advertising is to try to convince consumers that most people prefer a particular brand, product or service in order to induce it to impulsive consumption, without considering the alternatives in the market. Thus, with regard to consumption, follow the decision of the majority has its logic, since instead of wasting time and energy researching about each company or product available in the market, simply assume that the most consumed should be the best. And sometimes it really is. (CVM Comportamental, 2017).</p>
----------------------------	------------------	---

Table 2: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Bias: Economic Obsolescence x Optimism Bias

Economic Obsolescence	Optimism Bias	<p>The Economic Sciences sometimes explain countless mistaken decisions about market forecasts, which end in bankruptcies, stock market crashes and private equity impairment. Not infrequently, decisions taken in highly optimistic contexts end up in legal problems.</p> <p>In 2011 Brazil ranked 4th among the most optimistic countries in relation to employment in the same year. The International Business Report 2011 study, conducted by Grant Thornton, showed that the Brazilian indicator was + 47%, losing only to India (+ 64%), Turkey (+ 60%) and Vietnam (+ 57%). With this indicator, Brazil's optimism was well above the global average, which was +19. The survey was conducted with more than 11 thousand companies from 39 countries. The sense of income availability, long-term ability to easily obtain employment, consumption of durable products in the long run, and increased household indebtedness are naturally presumable consequences. Take the example of the survey conducted by the Household Expectation Index , prepared quarterly by the IPEA. The report no. 9/2011, showed that 88.08% of the families in the northern region claim to be in a secure situation when the person in charge of the household is employed. In a contradictory way, in the same study 54% of families in the northern region said they will not be able to pay back bills, simply the highest rate in all regions of the country. One notes, therefore, not only a strong bias of optimism, but also a serious financial disturbance. In the case of families in the northern region, the sense of security is not related to the payment of debts in arrears, which undoubtedly leads to lawsuits of various natures, not counting the economic effect of large-scale delinquency. (Grant Thorton Report,2011) and (IPEA Report,2011).</p>
--------------------------	------------------	--

*Table 3: Planned Obsolescence Classification according to Cooper (2004) x Cognitive Biasis: Technological Obsolescence
x Present Bias*

Technological Obsolescence	Present Bias	<p>The human instinct for survival, the loss aversion and the difficulty that the human being has to imagine the future, when compared with the perception of the present moment, are characteristics that reveal the preference to receive a reward now, either because it is not certain that whether he will be alive to receive it in the future, or because he will not enjoy it now, the human being will have to face the anxiety or fear produced by waiting and the inability to assess what value that benefit will have in the future. It seems that this behavior is an inheritance of the evolutionary process: the first homo sapiens, threatened by scarcity and who had a predilection for immediate reward, were more likely to survive and thus transfer their genes to offspring lineages when compared to those less guarded members of the clan. In addition, some cultural features of contemporary society tend to reinforce the preference for immediate gains, as in the case of marketing. Recent theory in this area has assimilated the new findings on the functioning of the human brain and the campaigns developed by its professionals are largely designed to forge needs / experiences / patterns of consumption and to induce the consumer to serve them as soon as possible. (Shane, F.; Lowenstein,G. O'Donoghue,T, 2002)</p>
----------------------------	--------------	---

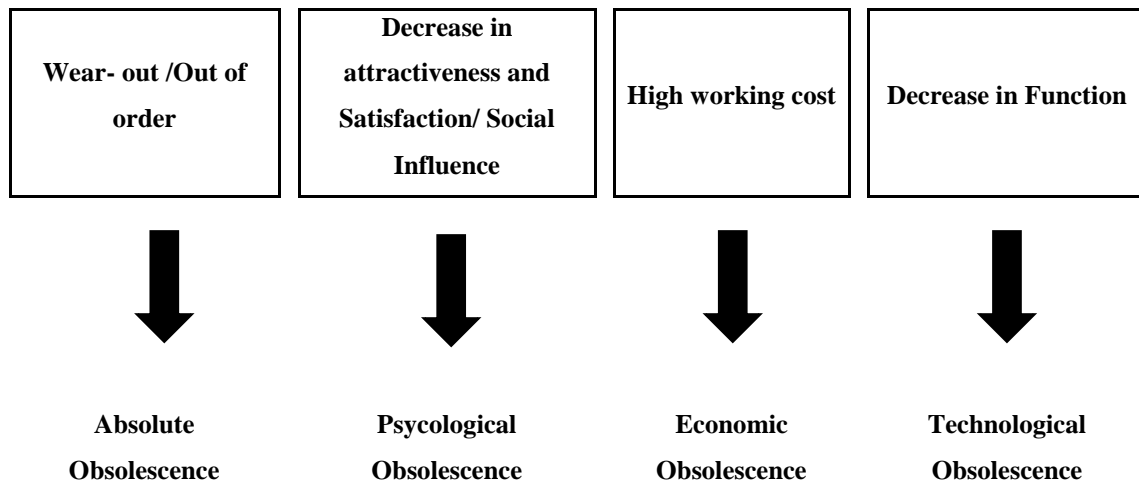


Figure 1: Mapping of identified categories to Cooper's theory

Basead on Cooper's category mapp, the questionnaires were organized in four sections for analysis:

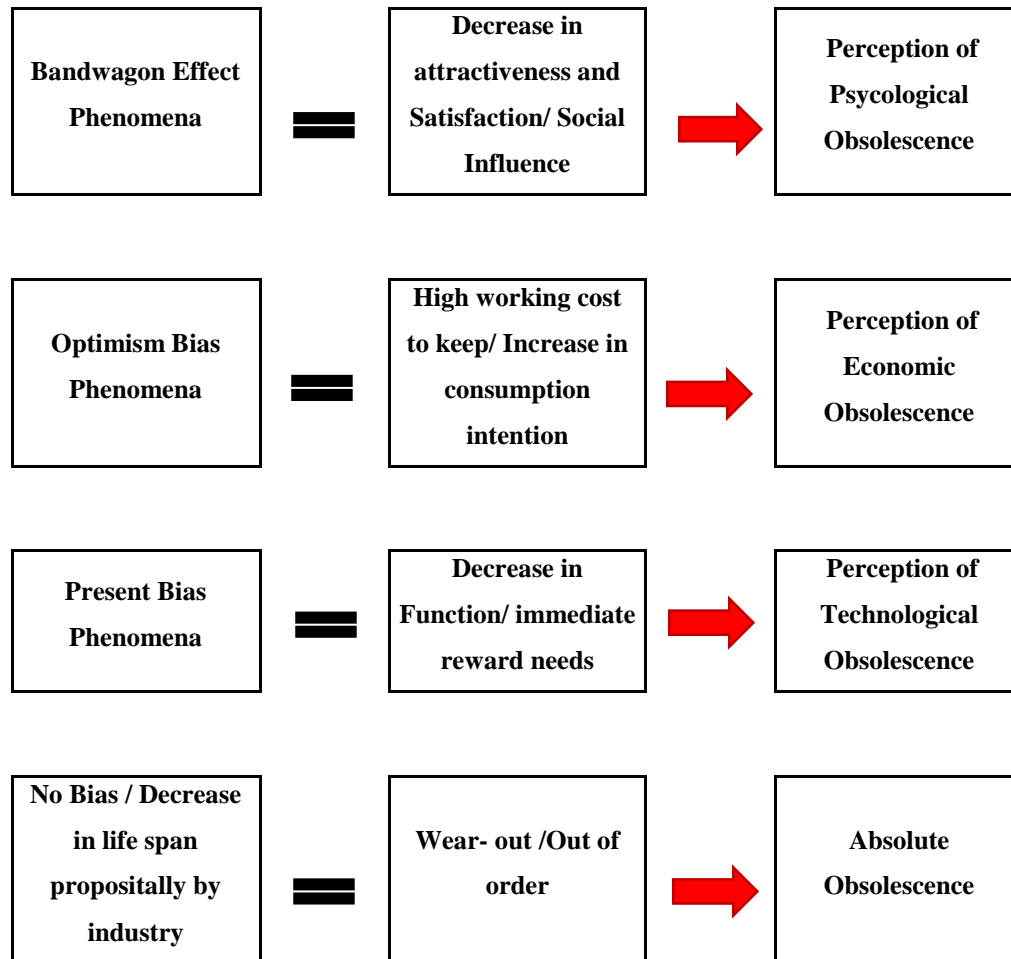


Figure 2: Questionnaire division

3.4 EXPERIMENT PERIOD AND PLANNING

The experiment was conducted from March 5 to 31, 2018, four weeks.



Figure 3: Opinion Box Platform

1- Quanto você está disposto a pagar por um aparelho de celular de sua marca preferida?*

☐ Até R\$1.000,00

☐ De R\$1001,00 a R\$2.000,00

☐ De R\$2.000,00 a R\$3.000,00

☐ Acima de R\$3.001,00

Powered by Opinion Box

Figure 4: Opinion Box Sample question

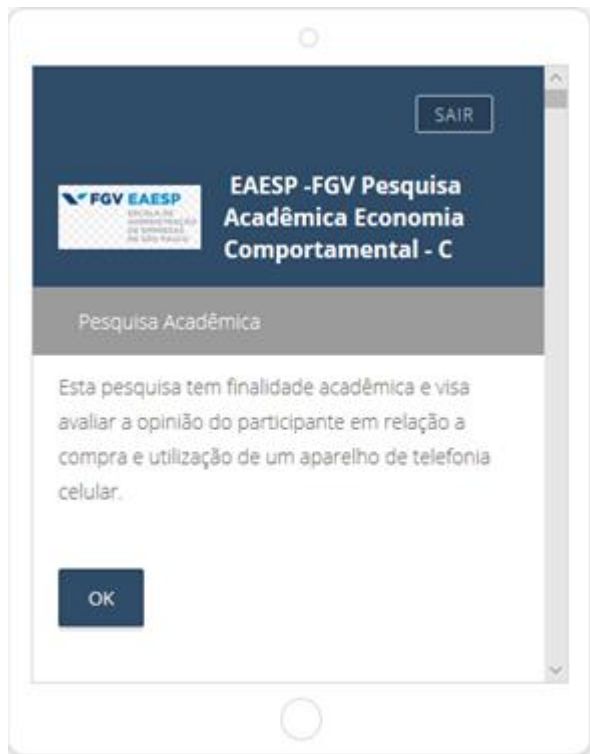


Figure 5: Survey monkey platform: Survey with cognitive biases applied

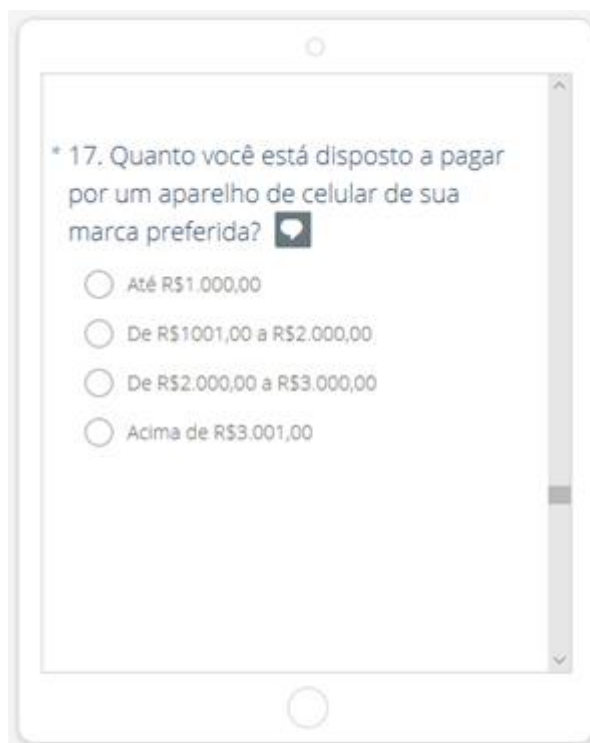


Figure 6: Survey monkey platform: Survey with cognitive biases applied – Sample question



Figure 7: Survey Monkey Platform: Survey without cognitive biases applied

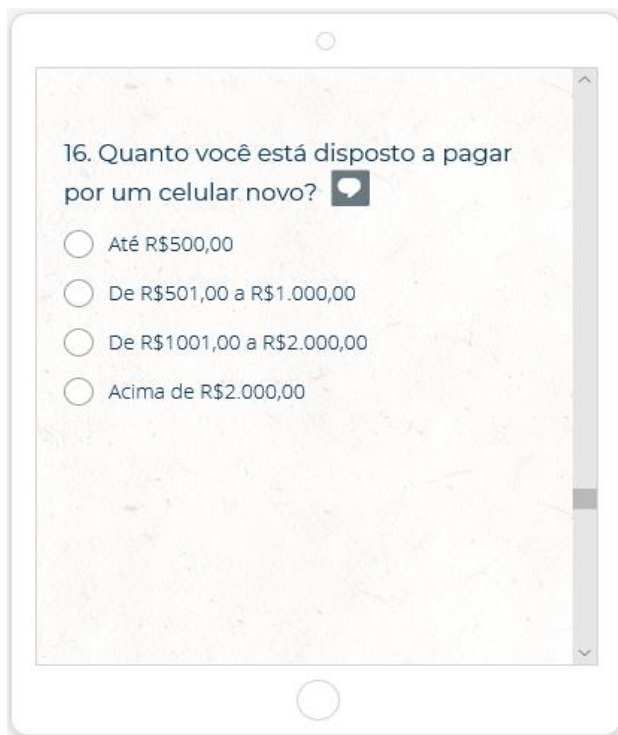


Figure 8: Survey Monkey Platform: Survey without cognitive biases applied – Sample question

4. RESULTS AND RESULTS ANALYSIS

For a better analysis, the questionnaire was divided in four sessions using the obsolescence classification according to Cooper (2004): Questions related to absolute obsolescence and issues related to relative obsolescence: Psychological obsolescence, Economic obsolescence and Technological obsolescence.

“The study of perception is essentially how we make sense of or assign meaning to, the raw sensations we experience when we encounter different stimuli” (Solomon, 2015).

According to Cooper model, the perception of relative obsolescence occurs before absolute obsolescence. The figure below explains graphically its phenomena:

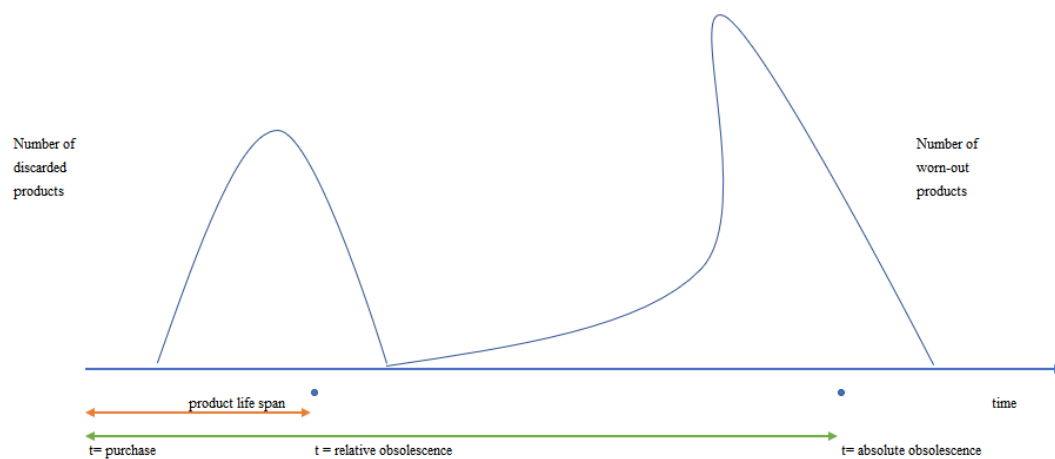


Figure 9: Relative Obsolescence x Absolute Obsolescence according to Cooper (2004)

Where $t_{\text{Relative obsolescence}} < t_{\text{Absolute obsolescence}}$. The questions were analyzed in those classifications groups according to hypothesis established. ANOVA Analysis was proceeded to understand the effect of the handling applied in the treatment group, followed for Correlation between group choices. A total of 358 people, aged 16 to 70 years, from all Brazilian territory, all genres, were randomly divided between the control group and the treatment group. For the control group, 151 respondents were registered and for treatment group 207 respondents, identified according to the table below:

Table 4: Participants by gender

	Control Group	Treatment Group
Female	101	109
Male	49	96
Other gender	1	2
Total	151	207

Source: Prepared by the author, during the research development, 2018.

Table 5: Participants by age

	16 - 24	25 - 29	30 -39	40-49	>= 50	Total
Control Group	22	43	45	27	14	151
Treatment Group	21	33	68	57	28	207

Source: Prepared by the author, during the research development, 2018.

4.1 RESULT ANALYSIS H1 - THE BANDWAGON EFFECT AND THE PSYCHOLOGICAL OBSOLESCENCE

The ANOVA test result for the H1 P value $< 0,05$, drive the research conclude that, the Cognitive Biases “Bandwagon Effect” affects the consumer’s perception of Psychological Obsolescence. It has been observed that social influence, the need for belonging, and even social and behavioral restrictions, affect the consumer dissatisfaction with the product and decrease product attractiveness.

Table 6: Results - Hypothesis 1

Feeling of satisfaction related to purchasing decision	Var %	P -value
Control Group	25%	0,046238
Treatment Group	10%	
Favorite Brand Awareness	Var %	P -value
Control Group	22%	0,00022
Treatment Group	13%	
Awareness of family's and social circle favorite brand	Var %	P -value
Control Group	25%	0,00000
Treatment Group	11%	
Social influence on the purchase decision	Var %	P -value
Control Group	59%	0,00066
Treatment Group	48%	

Source: Prepared by the author, during the research development, 2018.

This study segmented the participants by gender and age, resulting in the following information:

The research shows that, average 68% of the participants in the control group have a favorite phone brand, while average 84% of participants in the treatment group recognize a particular brand of mobile device as a favorite. There is no significant difference between genders regarding the recognition of a favorite brand of mobile phone. In the control group, 32% of women and 37% of men would buy the same brand of phone that a family member or person close to their social circle, against 15% of women and 18% of men in the treatment group. About 90% of the respondents were satisfied with their purchases and there was no significant variation between the genders. We can highlight that considering a margin of error of 5%, all the women who answered the treatment questionnaire were satisfied with their acquisitions of new mobile phones.

Table 7: Gender Analysis of Hypothesis 1:

Favorite Brand Awareness						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Have favorite mobile brand	66%	69%	100%	83%	84%	100%
Don't have favorite mobile brand	34%	31%		17%	16%	
Social influence on the purchase decision						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Very likely to buy same brand as a family and social circle	32%	37%	100%	15%	19%	
Somewhat Likely to buy same brand as a family and social circle	39%	45%		51%	44%	100%
Unlikely to buy same brand as a family and social circle	30%	18%		34%	38%	
Feeling of satisfaction related to purchasing decision						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Satisfied for cost- benefit reasons	90%	90%	100%	96%	92%	100%
Satisfied for psychological reasons	6%	0%		3%	6%	
Unsatisfied for cost-benefit reasons	4%	10%		1%	2%	
Unsatisfied for psychological reasons						
Awareness of family's and social circle favorite brand						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Have favorite mobile brand	44%	73%	100%	83%	92%	100%
Don't have favorite mobile brand	56%	27%		17%	8%	

Source: Prepared by the author, during the research development, 2018.

Table 8: Age Analysis of Hypothesis 1:

Feeling of satisfaction related to purchasing decision										
	Control Group (n=151)					Treatment Group (n=207)				
	16 - 24	25 - 29	30 -39	40-49	>= 50	16 - 24	25 - 29	30 -39	40-49	>= 50
Satisfied for cost- benefit reasons	95%	98%	96%	74%	71%	90%	82%	99%	98%	93%
Satisfied for psychological reasons	5%	2%	2%		21%	5%	18%	1%	2%	
Unsatisfied for cost- benefit reasons			2%	26%	7%	5%				7%
Social influence on the purchase decision										
	Control Group (n=151)					Treatment Group (n=207)				
	16 - 24	25 - 29	30 -39	40-49	>= 50	16 - 24	25 - 29	30 -39	40-49	>= 50
Very likely to buy same brand as a family and social circle	73%	28%	27%	30%	21%	29%	15%	21%	5%	21%
Somewhat Likely to buy same brand as a family and social circle	18%	63%	47%	26%	14%	67%	55%	38%	58%	32%
Unlikely to buy same brand as a family and social circle	9%	9%	27%	44%	64%	5%	30%	41%	37%	46%

Source: Prepared by the author, during the research development, 2018.

As seen in Table 7, for both genders, there is a clear identification of favorite brands. For the control group, it was only asked if there was a favorite brand and for the treatment group it was given some brand choices and asked to choose between the brands. In the treatment group there is a clear identification with the trade marks for both genders. Also, regarding the identification of the favorite brands of their social circle, the treatment group, where brand choices were given, the preferred brands that dominate the minds of consumers are more clearly shown as favorite brands in this study, which is Apple. Regarding the influence of the social circle in the purchase decision, for the control group, it was only asked if the respondent would buy the same brand of cell phone as someone from their family or social

circle. demonstrate clearly the decision making without analysis, only by social stimulus, resulting in a clear difference in hypothetical decision making. When they are not exposed to rational elements, individuals are more susceptible to the herd effect and therefore consume, even without need. When asked about the feeling of satisfaction when buying a particular product, there is no significant difference in the group of respondents who said they were satisfied with the cost-benefit of the decision. Regarding the psychological factors involved in the purchase, about 9% of the respondents in the treatment group admit buying to feel inserted in a certain social circle. Respondents in the treatment group, however, admit having limited self-control at the time they make the purchase decision.

For both groups, more men admitted buying to feel accepted and admitted having little self-control over their purchases. In relation to satisfaction with the purchase decision, age is also a determining factor. Full satisfaction with cost-benefit falls by 22 percentage points from the age of 40 and 25 percentage points from the age of 50, indicating a greater rigidity in the judgment for the control group. On the other hand, in admitting the need to belong to a certain social group, from the age of 50 onwards, it shows that the older ones are also as sensitive to the herd effect as the younger ones. There is also a greater index of dissatisfaction with the amount spent in the age group from 40 to 49 years, showing a lack of self-control in this age group for the control group. In the treatment group, taking into account the margin of error of 5%, almost 100% of the respondents are satisfied with the cost-benefit of their purchases, except for the 25 to 29 age group, who admit buying for psychological reasons social acceptance.

Regarding the influence of their groups in their purchasing decisions, in the control group, most young people up to 24 years of age admit buying for social influence, while in the age groups 25 to 29 and between 30 to 39 years of age, they admit to take into account the opinion of their social circle, but just a little unlikely to buy the same brand. However, in the 40-49 age group and over 50, most respondents do not take into account the opinions of others when making the purchase decision. In the treatment group the largest influences by the opinion of their social circle are the youngsters up to 24 years old, while in the classification of a unlikely, the majority of the respondents, highlighting the youngsters up to 24 years and adults from 40 to 49 years, analyze the opinion of their social circle, but do not make decisions based solely on the majority. And again, adults between 40 and 49 years and over 50 years do not demonstrate to decide for the purchase of a mobile device based on the opinion of their social circle. Despite the considerable number of participants declaring that they do not take decisions based on the opinion of their social circle, participants wish to be accepted and be part of a

particular group, yet, by explaining that they have a favorite brand, it makes clear that the Bandwagon effect manifests itself in the choice by a standard that the majority understands to be the standard of quality. Not infrequently, individuals go through social constraints and are confronted with questions such as: Don't you think it's time to buy another cell phone? Your device does not perform a certain function! Aren't you ashamed to have a brand-name device? Still, the spread of Internet use and the emergence of new social networks of relationship, create the emotional need to have a device that allows access to a particular group of relationships. Not just for young people, as for adults and people who are close to senior citizens.

Brands like Apple, invest heavily in marketing to develop the concept of exclusivity and participation in a select group. "Apple Family" or "Apple Community", whose objective is to really capture hearts and minds, making the consumer not only buy mobile phones but also other electronic devices. In this research, in the treatment group, the I phone Brand was cited as the preferred brand of the majority in all age brackets studied. Not only for quality and innovation, but also for prominence and social acceptance.

People around the world queue for hours to buy an Apple mobile phone the day of its release. Besides the financial cost, they spend their time and energy to get the precious object. And as a reward, they get a real Apple Store employee party as a way to celebrate the dreamed "acquisition" (Eadicicco, 2015).

4.2 RESULT ANALYSIS H2 – THE OPTIMISM BIAS AND PURCHASE DECISION

The ANOVA analysis result for H2 was $P \text{ value} < 0,05$, what lead us to reject the H_0 and accept H2 which is "The Optimism bias affect customer's choice in all purchasing decision".

Table 9: Results - Hypothesis 2

Willingness to spend or save money	Var %	P -value
Control Group	57%	
Treatment Group	22%	0,000000
Perception of the economic and political scenario	Var %	P -value
Control Group	71%	
Treatment Group	3%	0,003115

Source: Prepared by the author, during the research development, 2018.

Table 10: Results Gender Analysis of Hypothesis 2:

Willingness to spend or save money						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Very likely to buy a mobile phone instead of investing in a simple financial application	18%	20%		2%	5%	
Somewhat Likely to buy a mobile phone instead of investing in a simple financial application	47%	12%	100%	17%	7%	
Unlikely to buy a mobile phone instead of investing in a simple financial application	36%	67%		82%	88%	100%
Perception of the economic and political scenario						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Optimism perception regarding economic and social scenario within two years	57%	22%		2%	1%	
Pessimism perception regarding economic and social scenario within two years	19%	43%		98%	97%	100%
The same current scenario remains	24%	35%	100%		2%	

Source: Prepared by the author, during the research development, 2018.

In times of crisis, the first indicator of it is the unwillingness of individuals to spend. In the studied population, the control group demonstrated that both men and women are willing to spend immediately, with some resistance to medium and long term investments (18% and

20% of the study population, respectively). But in the treatment group, where the directed question leads the individual to use system 2 (Kahneman, 1979), to make simple accounts and to conclude that there is a financial advantage in investing although the income is not great, they prefer save money. It is also observed in the control group that individuals classified as being female are more likely to spend and less willing to save. In the treatment group, although to a lesser extent, this premise is confirmed. In other words, men are more sparing. Regarding the political and economic scenario, it is clear that the treatment group responds in a much more homogeneous way, showing pessimism, therefore, unavailability to spend and a greater propensity to save or pay debts. In the control group, women are also more optimistic than men, that is, more willing to spend.

Table 11: Results Age Analysis of Hypothesis 2:

Willingness to spend or save money										
	Control Group (n=151)					Treatment Group (n=207)				
	16 - 24	25 - 29	30 -39	40-49	>= 50	16 - 24	25 - 29	30 -39	40-49	>= 50
Very likely to buy a mobile phone instead of investing in a simple financial application	73%	28%	27%	30%	21%	29%	15%	21%	5%	21%
Somewhat Likely to buy a mobile phone instead of investing in a simple financial application	18%	63%	47%	26%	14%	67%	55%	38%	58%	32%
Unlikely to buy a mobile phone instead of investing in a simple financial application	9%	9%	27%	44%	64%	5%	30%	41%	37%	46%
Perception of the economic and political scenario										
	Control Group (n=151)					Treatment Group (n=207)				
	16 - 24	25 - 29	30 -39	40-49	>= 50	16 - 24	25 - 29	30 -39	40-49	>= 50
Optimism perception regarding economic and social scenario within two years	36%	19%	9%	26%	7%	5%	12%	3%	0%	0%
Pessimism perception regarding economic and social scenario within two years	50%	37%	51%	7%	14%	48%	15%	3%	9%	11%
The same current scenario remains	14%	44%	40%	67%	79%	48%	73%	94%	91%	89%

Source: Prepared by the author, during the research development, 2018.

In the control group, it is clear that younger individuals are more willing to spend than to invest. In the 16-29 age groups, most of the people who do not worry about saving money are concentrated, both in the control group and in the treatment group. Individuals over 40 are less willing to spend. In relation to the social and economic situation in the country, the optimists are the youngest, while the pessimists and conservatives are concentrated in the age

group 30. Despite evaluating the political and economic scenario in a pessimistic way, the Brazilians still have the intention to consume: 54% of the control group prefers to buy a cell phone than to invest against 15% of the treatment group.

4.2 RESULT ANALYSIS H2b - THE OPTIMISM BIAS AND ECONOMIC OBSOLESCENCE

The ANOVA analysis result for H2b was $P \text{ value} > 0,05$, what lead us to reject the H2b and accept H_0 , which is “The bias of optimism doesn’t affect **only** the consumer's perception of economic obsolescence”.

Table 12: Results - Hypothesis 2b

Willingness to pay for a new mobile	Var %	P -value
Control Group	42%	0,628991
Treatment Group	42%	
Willingness to pay for the repair of your current mobile phone		
	Var %	P -value
Control Group	60%	0,545408
Treatment Group	59%	

Source: Prepared by the author, during the research development, 2018.

In fact, the Optimism Bias affects every purchase decision, not only the decision to purchase a mobile. However, according to the classical theory of planned obsolescence, the objective of planned obsolescence was to create conditions for repeated purchases, and one of them was to make the repair of the product expensive, inaccessible, and impossible. It is noted in the tables below that consumers who participated in this survey are not willing to pay expensive repairing for their mobile and also, they are looking for a quality product at an affordable price. The average ticket is between R\$ 1,000.00 and R\$2.000, 00.

Table 13: Hypothesis 2b Analysis per group

Willingness to pay for a new mobile		
	Control Group (n=151)	Treatment Group (n=207)
Up to R \$ 1,000.00	55%	52%
From R \$ 1001,00 to R \$ 2,000.00	37%	40%
Above R \$ 2,000.00	8%	9%

Source: Prepared by the author, during the research development, 2018.

There is no significant difference between Control Group and Treatment Group regarding to the price they are willing to pay for a new mobile. Therefore even people who is a specific brand fan, when is confronted about price, they think in a cheap but good quality mobile. When someone buys a mobile, buys a brand, a style, and then, doesn't evaluate the device.

Table 14: Hypothesis 2b Analysis per group

Willing to pay for the repair of your current mobile		
	Control Group (n=151)	Treatment Group (n=207)
Up to R \$ 100.00	45%	47%
Between \$ 101 and \$ 300	44%	47%
Between R \$ 301,00 and R \$ 500,00	7%	0%
More than R \$ 500,00	4%	6%

Source: Prepared by the author, during the research development, 2018.

Also there is no significant difference between Control Group and Treatment Group regarding the repair expense that they are willing to pay.

The Economic Obsolescence concept drive us to understand that, the cost to repair and to keep the mobile must worth considering how long the consumer already has the device , how much it costs to repair and how much a new mobile costs. For this sample, the cost to repair must be less then R\$301, 00 and the price to buy a new one must be less than R\$2.000, 00.

Table 15: Hypothesis 2b Analysis per group

Perception of Economic Obsolescence		
	Control Group (n=151)	Treatment Group (n=207)
The more expensive the phone costs, the longer it should work.	54%	37%
The cheaper the phone costs, the less time it should work	1%	1%
The more expensive the cell phone, the higher the cost of maintenance, but the better service network	13%	28%
The cheaper the phone, the higher the cost of maintenance.	4%	3%
When a cheap cell phone breaks down, it's better to buy another one than try to fix it.	28%	31%

Source: Prepared by the author, during the research development, 2018.

4.3 RESULT ANALYSIS H3 - THE PRESENT BIAS AND TECHNOLOGICAL OBSOLESCENCE

The ANOVA analysis result for H3 was P value > 0, 05, what lead us to reject the H3 partially.

Table 16: Results – Hypothesis 3

ANOVA test		T Test	
Purchase frequency	P -value	Purchase frequency	P -value
Control Group		Control Group	
Treatment Group	0,0062	Treatment Group	0,0069
Expected life span	P -value	Expected life span	P -value
Control Group		Control Group	
Treatment Group	0,1231	Treatment Group	0,126169
Technology attraction	P -value	Technology attraction	P -value
Control Group		Control Group	
Treatment Group	0,7074585	Treatment Group	0,7381036
Repeated Purchase brand	P -value	Repeated Purchase brand	P -value
Control Group		Control Group	
Treatment Group	0,0950567	Treatment Group	0,1051497

Source: Prepared by the author, during the research development, 2018.

It was performed a T test in order to grant a correct analysis, and this test confirmed the partially rejection of hypothesis H3. There is no significant difference in the behavior of the analyzed sample, between Control Group and Treatment Group, regarding to Expected life span, Technology attraction and Repeated purchase brand. Was found only a significative difference regarding to Purchase frequency.

Table 17: Results – Hypothesis 3 Analysis per group

Purchase frequency		
	Control Group (n=151)	Treatment Group (n=207)
Between 1 and 2 years	40%	28%
Less than 6 months	2%	0%
Between 6 months and 1 year	1%	0%
More than two years	57%	71%
Expected life span		
	Control Group (n=151)	Treatment Group (n=207)
Up to 1 year	6%	1%
From 2 to 3 years	37%	37%
3 to 5 years	31%	29%
over 5 years	27%	32%
Repeated Purchase brand		
	Control Group (n=151)	Treatment Group (n=207)
Very likely	74%	80%
Somewhat Likely	16%	14%
Unlikely	10%	6%
Technology attraction		
	Control Group (n=151)	Treatment Group (n=207)
Buy without special reason	6%	1%
Buy because you like technology	3%	0%
Don't buy	81%	99%
Buy because you need new one	10%	0%

Source: Prepared by the author, during the research development, 2018.

Regarding the replacement of the mobile device, the control group considers using a mobile device for 1 or 2 years - 40% and up to more than 2 years 57%, and the treatment group, adopts a more conservative stance, about 71 %. This expectation of substitution corroborates with the expectation of duration of the mobile devices with all its functionalities. Approximately 27% of participants in the control group and 32% of the treatment group expect

that the lifetime of their device will exceed 5 years. Most participants, however, show satisfaction with the brand used, about 74% of the participants in the control group and 80% of the treatment group would buy the same brand of handsets that they bought some day (repeat purchase). Such behavior is only possible if the consumer sees quality of the product and respect for the consumer. Although consumers are in the information age, 81% of the control group and 99% of the treatment group would not buy a mobile device because of passion for the technology. Thus, despite the Present Bias exist in the Brazilian consumer's behaviour, in the sample studied, the preference for financial and emotional rewards today, do not lead the consumer to buy a handset for identifying that his device is outdated.

Table 18: Results Gender Analysis of Hypothesis 3

Purchase frequency						
	Control Group (n=151)			Treatment Group (n=207)		
	Female	Male	Other	Female	Male	Other
Between 1 and 2 years	41%	41%		23%	33%	50%
Less than 6 months	2%	2%				50%
Between 6 months and 1 year			100%			
More than two years	57%	57%		77%	67%	

There is no difference between gender preference in the Control and Treatment Group regarding to purchase frequency.

Table 19: Results Age Analysis of Hypothesis 3

Purchase frequency										
	Control Group (n=151)					Treatment Group (n=207)				
	16 - 24	25 - 29	30 -39	40-49	>= 50	16 - 24	25 - 29	30 -39	40-49	>= 50
Between 1 and 2 years	50%	47%	33%	44%	21%	38%	36%	21%	35%	14%
Less than 6 months	5%					5%				
Between 6 months and 1 year	5%	5%								
More than two years	41%	49%	67%	56%	79%	57%	64%	79%	65%	86%

4.4 RESULT ANALYSIS H4 - PLANNED OBSOLESCENCE AND THE PURCHASE DECISION

The ANOVA analysis result for H4 was P value $> 0,05$, what lead us to reject the H4:

Table 20: Results – Hyphotesis 4

Obsolescence as a reason to replace	Var %	P -value
Control Group	64%	0,201550
Treatment Group	65%	

Source: Prepared by the author, during the research development, 2018.

Finally, when participants were asked what the general reason why they buy a new mobile phone is, both for the control group and the treatment group, 37% and 31% of each group respectively, pointed out the fact that the device has broken and there is no further repair. The research, however, points out that the life expectancy of a mobile phone is greater than 5 years for 27% and 32% for the control and treatment groups, respectively – table 17. It is also known that it is expected that if a device costs more, it should last longer, contrary to the classical theory of planned obsolescence.

Table 21: Hyphotesis 4 Analysis per group

Obsolescence as a reason to Replace		
	Control Group (n=151)	Treatment Group (n=207)
It broke. There was no repair.	36%	31%
Had problems with some functions	36%	35%
It was working, but I would like a more modern with more functions	28%	34%

Source: Prepared by the author, during the research development, 2018.

5. CONCLUSIONS

This work addresses the matter if Cognitive Bias can influence consumer's obsolescence perception. To answer the research question "Does planned obsolescence influence the consumption decision?" An experiment was conducted in a survey format, and separated into two groups: Control group and treatment group. The questions were sent to people all over Brazil, of all age and gender ranges. With this theoretical and methodological framework, it was possible to construct five hypotheses that could answer the research question. The hypotheses of study were tested by means of an experimental quantitative research in the laboratory.

The results obtained allowed the validation of two hypotheses and the rejection of the other three, according to table 22.

Table 22: Summary of hypotheses and results

Hypothesis		Conclusion
H1	The Bandwagon effect positively affects the perception of consumer psychological obsolescence	Hypothesis accepted
H2	The Optimism bias positively affect customer's choice in all purchasing decision	Hypothesis accepted
H2b	The bias of optimism positively affects only the consumer's perception of economic obsolescence.	Hypothesis Rejected
H3	The Present bias positively affects the consumer perception of technological obsolescence	Hypothesis Rejected
H4	Planned obsolescence is a decisive factor for the purchase decision	Hypothesis Rejected

Source: Prepared by the author, during the research development, 2018.

Acceptance of Hypothesis H1 demonstrates how influential the Bandwagon Effect can be in the decision making of the consumer. The rejection of Hypothesis H2b, although it seems obvious, demonstrates adherence to the experiment and confirms that the optimism bias influences all the buying decisions. In the current economic and political scenario, although the respondents mostly showed pessimism, when exposed to issues such as unemployment and violence - treatment group, the control group did not express significant concern about the future. For this group of people, there is no need to save money. It is evident the presence of

the Optimism Bias in these answers, which corroborates with the acceptance of the H2 hypothesis. Other related factors make the presence of the Optimism Bias more accentuated. Together with the bias of optimism, the need to belong to a particular group - Bandwagon Effect, socio-cultural factors and yet not less important, the effect of the shortage lived in a not too distant past, lead the Brazilian population to be more sensitive to the Optimism Bias.

Although many Brazilians define themselves as passionate about technology, which would lead them to forego saving money to buy a cell phone (Present bias), the sample of the population studied did not show great appreciation for technology, thus refuting Hypothesis 3. Hypothesis 3 can be partially rejected, since 40% of respondents in the control group consider a new purchase between 1 and 2 years, compared to 28% of exposed to treatment. It is also observed the loyalty of the preferred brand in both groups studied. In other issues analyzed, younger people prefer to buy a new mobile than to simply invest, while older ones prefer to save money. It is recognized that other cognitive biases together can influence the decision to spend rather than saving.

The rejection of Hypothesis 4 refutes the theory widely publicized in the media that companies profit much more by practicing planned obsolescence. About 30% of the interviewees in both the control group and the treatment group exchanged their devices because it broke and there was no repair. Although companies such as Apple admit that they practiced so-called planned obsolescence, consumers remain eager for new brand launches. It is concluded that, the classical concept of planned obsolescence no longer fits the world today. Companies that practice the classic planned obsolescence run the risk of losing their customers and seeing their brand stained instead of profiting. No consumer feels satisfied with a company that disrespects their rights. Therefore, the consumer protection agencies and the State have an important role in regulating the rules of manufacture and protection of consumer rights. However, it should be noted that most people are unaware of the planned obsolescence and the media end up demonizing the concept. All companies practice planned obsolescence, some dishonestly and others by the very requirement of the competitive market. The planned obsolescence of the 21st century is actually life-cycle planning for a product. The planned obsolescence of the twenty-first century is called innovation and is irreversible. When a product is released, engineers are already working on a new version. According to Schumpeter, innovation is the driving force behind economic growth.

In general, therefore, it can be affirmed that, from the obtained results, the research question was answered and that the objective proposed in the present work was reached in a

satisfactory way. The planned obsolescence in its classic concept does not influence the consumer purchase decision. On the other hand, the cognitive biases Bandwagon Effect and Optimism Bias cause the consumer to feel the need to obtain a new product, generating the perception of psychological obsolescence on a larger scale and secondly technological obsolescence.

In this sense, this study enriches the academic literature on the theory of planned obsolescence, aggregating content, specifically, about how certain cognitive biases that influence consumer buying decision making.

For companies in general, this present work offers insights for the development and consolidation in the market: innovation. To be competitive and profitable, they must find alternatives that attract and retain the consumer, especially, as seen in this work, in the public aged 40.

5.1 STUDY LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCHS

This experiment was classified as a laboratory experiment. A field experiment could be more efficient and generate more enriching information. With the application of questionnaires, the respondent can intentionally or not, misunderstand the questions, misinterpret what is being asked or even deceive the researcher (Malhotra, 2011).

Another important limiting aspect is the impossibility of having the same number of participants by gender and age, and can thus map which age groups and genders could be more affected by certain cognitive biases. Still in this sense, the cognitive biases can not be totally isolated, having influence of more of a bias in the moment of the decision of purchase of the consumer. Thus, even if the questions are extracted by a group of biases, there may be more than one bias per hypothetical response.

The results obtained by this work, while validating the influence of cognitive biases in purchasing decision making, do not provide a conclusion about the level of intensity in which this influence is present. To map the intensity level, future studies may address specific brands, socio-demographic characteristics of the participants, and the context in which the purchase transaction is performed.

Bibliographic references

- Abhijit V. B. (1992). A Simple Model of Herd Behavior. *The Quarterly Journal of Economics*, 107 (3), 797-817.
- Adolphson, D. (2005). A New Perspective on Ethics, Ecology and Economics. *Journal of Business Ethics*, 54.
- Amos T. (1974). *Daniel Kahneman Science: New Series*, 185 (4157), 1124-1131
- American Society of Appraisers (2011). *Valuing Machinery and Equipment: The Fundamentals of Appraising Machinery and Technical Assets*, 3.
- Ariely, D. (2008). *Predictably Irrational*. Harper Collings.
- Avanzi, D. P. (2016). *Como influenciar a decisão de compra do shopper em supermercados: os efeitos dos vieses cognitivos aversão à perda, contas mentais e priming effect*, aplicados em materiais de comunicação.
- Akerlof, G. (1991). Procrastination and Obedience. *American Economic Review*, 81 (2), 1-19. ABI/INFORM Global.
- Bashir, O. (2000) Managing Obsolescence in information Technology. *Working document presented in the National IT conference 2000*. Islamabad.
- Bagwell, L. S. & Bernheim, B D. (1996). Veblen effects in a theory of conspicuous consumption. *The American Economic Review*. 86 (3). pg. 349 .ABI/INFORM Global.
- Barreca, S. L. (1998). *Technology Life-Cycles And Technological Obsolescence*. Available at: <http://www.bcric.com/downloads/valuation%20paper.pdf>
- Bearden, E. (1982). Reference Group Influence on Product and Brand Purchase Decisions. *Journal of Consumer Research*, 9 (2), 183-194.
- Belk, R.W. (1988). Possessions and the Extended Self. *Journal of Consumer Research*, 15 (2), 139-168.
- Berz, P., Hoge, H., Krajewski, M. (2011). Vom Krieg des Lichtes zur Geschichte von Glühlampenkartellen. *Das Glühbirnenbuch*. Braumüller Verlag
- Berry, S. (1994). Estimating Discrete-Choice Models of Product Differentiation. *RAND Journal of Economics*, 25 (2), 242-262.
- Bikhchandani, S., Hirshleifer, D., Welch, I. (1992). A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades. *Journal of Political Economy*, 100 (5), 992-1026.

- Bourne, F. S. (1957). Group influence in marketing and public relations. Some applications of behavioural research (pp. 207-257). Paris: UNESCO.
- Brazilian Institute of Economics (2018). *Consumer Survey*: Monthly report. Retrieved from: http://portalibre.fgv.br/main.jsp?lumPageId=402880811D8E34B9011D9852965E3CD4&lumA=1&lumII=4028818B2BD6C0D6012BEEDBB9613D55&locale=en_US&doui_processActionId=setLocaleProcessAction
- Bradley M., Dawson R.J. (1998) An Analysis of Obsolescence Risk in It Systems. In: Hawkins C., Ross M., Staples G. (eds) *Software Quality Management VI*. Springer, London
- Braun, O.T. & Wicklund R. A. (1989). Psychological antecedents of conspicuous consumption. *Journal of Economic Psychology* 10 (2), 161-187.
- Bruce L. Stern (1979). *The World of Goods*: Douglas, Mary and Baron Isherwood, 9 (3). New York: Basic Books.
- Bourdieu, P. (1984). *Distinction: A Social Critique of the Judgement of Taste*. London: Routledge.
- Bulow, J. (1986). An Economic Theory of Planned Obsolescence. *The Quarterly Journal of Economics*, 101 (4), 729-750.
- Busenitz, L. W., Barney, J. B., (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of Business Venturing*, 12 (1), 9-30.
- Burghart, A., Muller, B., Hanseder, W. (2014). 100 Jahre OSraM – licht hat einen namen. *Journal International: Hanns-Seidel-Platz* 5 (81737).
- Caputo, A. (2014). Relevant information, personality traits and anchoring effect. *International Journal of Management and Decision Making*, 13 (1), 62-76.
- Camargo, P. (2010). *Comportamento do consumidor: A Biologia, anatomia e fisiologia do consumo*. São Paulo Novo Conceito.
- Cassia, F. (2007). Open Source, the only weapon against planned obsolescence. *The Inquirer*. Available on: <https://www.theinquirer.net/inquirer/news/1001739/open-source-weapon-planned-obsolescence>
- Cooper T. (2004). Inadequate Life? Evidence of Consumer Attitudes to Product Obsolescence. *Journal of Consumer Policy*, 27, 421-449.
- Conlisk, J. (1996). Why Bounded Rationality? *Journal of Economic Literature*, 34, 669-700.
- Corneo, G. & Jeanne, O. (1997) Conspicuous consumption, snobbism and conformism. *Journal of Public Economics*, 66 (1), 55-71.

- Costa, D. F., Carvalho, F. D. M., Moreira, B. C. D. M., Prado, J. W. (2017). D. Bibliometric analysis on the association between behavioral finance and decision making with cognitive biases such as overconfidence, anchoring effect and confirmation bias. *Scientometrics*, 111 (3), 1775-1799.
- Costa, D. F. (2017). *Ensaio sobre vieses cognitivos no processo de tomada de decisão gerencial*. Tese (doutorado) - UFLA, MG, Brasil.
- Bruning, K.C. (2018). Cornelsen de Cost performance (ratio). Available on: <https://www.cornelsen.de/erw/1.c.3292933.de>
- Chamberlin, E. H. (1948). An Experimental Imperfect Market. *The Journal of Political Economy*, 56 (2), 95-108
- Chugani, S. K., Irwin, J. R, Redden, J.P, (2016). Happily Ever After: Hedonic Adaptation and Identity-Consistent Stimuli. *Journal of Consumer Research*, 564-577.
- Creswell, J. W. W. (2010). *Projeto de pesquisa: métodos qualitativo, quantitativo e misto*, 2, Porto Alegre: Bookman.
- Comissão de Valores Mobiliários (2017). CVM Comportamental: Vieses do Consumidor. 3. Available on: http://pensologoinvesto.cvm.gov.br/wp-content/uploads/2016/01/CVMComportamental_Vol3_ViesesConsumidor.pdf
- Comscore (2017). *The Global Mobile Report*. Available on: <https://www.comscore.com/Insights/Presentations-and-Whitepapers/2017/The-Global-Mobile-Report>
- David L. (1997). Golden eggs and hyperbolic discounting. *Quarterly Journal of Economics* 112(2), 443-477.
- Davis, D. & Holt, C. (1993). *Experimental economics: Methods, problems and promise*, Estudios Económicos, 8 (2), 179-212.
- Del Maestro, A. (2012). Planned Obsolescence: The good and the bad. *Working paper, Property and Environment Research Centre*. Available on: <https://www.perc.org/2012/07/18/planned-obsolescence-the-good-and-the-bad/>
- Dittmar, H. (1994). Material possessions as stereotypes: Material images of different socio-economic groups. *Journal of Economic Psychology*, 15 (4), 561-585.
- Dubois, B. & Duquesne, P. (1993). The Market for Luxury Goods: Income versus Culture. *European Journal of Marketing*, 27 (1), 35-44
- Eadicicco, L. (2015). What it was like at Apple's iconic 5th Avenue store during the launch of the iPhone 6S. Available on: <https://www.businessinsider.com.au/apple-iphone-6s->

[launch-photos-2015-9/#some-customers-opened-their-phones-in-the-store-as-soon-as-they-purchased-them-5](#)

- Echegaray, F. (2015). *Consumer's reactions to product obsolescence in emerging markets: the case of Brazil*. *Journal of Cleaner Production*, 191-203
- Economicdiscussion.net. Network Externalities: Bandwagon Effect and Snob Effect. Available on: <http://www.economicdiscussion.net/essays/economics/network-externalities-bandwagon-effect-and-snob-effect-with-diagram/934>
- Europost.com. Apple, Epson accused of planned obsolescence .2018. Available on: <http://www.europost.bg/bin/marticle?id=21614>
- Fabre, B. & Françoise-Heude, A. (2009). *Optimism and overconfidence investors' biases: a methodological note*. Finance 2009/1 (Vol. 30), p. 79-119. Presses universitaires de Grenoble.
- Fachin, O. (2003). *Fundamentos de metodologia*. 4. São Paulo: Saraiva.
- Fels, A., Falk, B., Schmitt, R. (2016) *Social media analysis of perceived product obsolescence* (26th CIRP Design Conference). Stockholm, Sweden. Elsevier Procedia.
- Ferreira, F. H. G., Messina J., Rigolini J., López-Calva L., Lugo, M. A., Vakis, R. (2013). *Economic Mobility and the Rise of the Latin American Middle Class*. Washington, DC: World Bank.
- Feltovich, N., Iwasaki, A., Oda, S. H. Payoff levels, loss avoidance, and equilibrium selection in games with multiple equilibria: an experimental study. *Economic Inquiry*, 50, 932-952.
- Festinger, L. A Theory of Social Comparison Processes, May 1954
- French, J. R. Jr. & Raven, B. (1959). The bases of social power. *Studies in social power* (pp. 150-167). Oxford: England.
- Foxall, G. R. & Sigurdsson, V. (2013). Introduction to the special issue - consumer behavior analysis: behavioral economics meets the marketplace. *The Psychological Record*, 63, 231-238.
- Gartenberg, C. (2018). Apple and Samsung are both under investigation by the Italian government over planned obsolescence. Available on: <https://www.theverge.com/2018/1/18/16906658/apple-samsung-investigation-italian-antitrust-planned-obsolescence-software-slowdown>
- Gayer, T. & Parker, E. (2013). *Cash for Clunkers: An Evaluation of the Car Allowance Rebate System*. Washington: Brookings Institution.

- Gohmann, S. F., Hobbs B.K., McCrickard, M. J. (2016). Productive versus unproductive entrepreneurship: Industry formation and state economic growth. *Journal of Entrepreneurship and Public Policy*, 5 (2), 145-160.
- Gonzalez, R. & Malbarez, M.R. (2011) La responsabilidad social empresarial y la obsolescencia programada. *Saber, Ciencia y libertad*, 6 (1), ISSN 1794-7154, Vol. 6, Nº. 1, 2011, págs. 127-138.
- Grant Thornton International Business Report, Global Economy in 2011. Available on: http://www.gtrus.com/main.php?chapter=public&page=survey_ibr_11
- Gravin, N., Immorlica, N., Lucier, B., Pountourakis, E. (2016) Procrastination with variable present bias: 17th ACM Conference on Economics and Computation.
- Guiltinan, J. (2009). Creative Destruction and Destructive Creations: Environmental ethics and Planned Obsolescence. *Journal of Business Ethics*, 89.
- Hanoch, Y. (2002). Neither an angel nor an ant: emotion as an aid to bounded rationality. *Journal of Economic Psychology*, 23, 1-25.
- Heckl, W. M. (2013). *Die Kultur der Reparatur*. München: Hanser Verlag München .
- Hirschman, E. C. (1988). The Ideology of Consumption: A Structural-Syntactical Analysis of Dallas and “Dynasty. *Journal of Consumer Research*, 15 (1), 344–359.
- Hindle, T. (2008). Guide to Management Ideas and Gurus. *Profile Books Ltd & the Economist*. London: The Economist Newspaper.
- Holt, D. B. (1995). How Consumers Consume: A Typology of Consumption Practices. *Journal of Consumer Research*, 22 (1), 1-16.
- Holt, D.B. (1998). Does Cultural Capital Structure American Consumption? *Journal of Consumer Research*, 25 (1), 1–25,
- Hong, J.W. & Zinkhan, G. M. (1995). Self-concept and advertising effectiveness: The influence of congruency, conspicuousness, and response mode. *Psychology & Marketing*, 12 (1), 53-77.
- Hyman, H. H. (1942). The psychology of status. *Archives of Psychology (Columbia University)*, 269,94.
- Institute of Applied Economic Research (IPEA) (2011). Household Expectation Index. Available: http://www.ipea.gov.br/portal/images/stories/PDFs/IEF/110310_ief07.pdf
- Investopedia.com.Bandwagon Effect. Available on: <https://www.investopedia.com/terms/b/bandwagon-effect.asp>

- Instituto Brasileiro de Geografia e Estatística (2005). *Acesso à Internet e posse de telefone móvel celular para uso pessoal*. Available on: <https://ww2.ibge.gov.br/home/estatistica/populacao/acessoainternet/default.shtm>
- Jackson, M. O. & Yariv, L. (2014). Present Bias and Collective Dynamic Choice in the Lab. *American Economic Review*, 104 (12), 4184–4204.
- Johnson, L. W. & Vigneron, F. (1999) A Review and Conceptual Framework of Prestige Seeking Consumer Behavior. *Academy of Marketing Science Review*, 1, 1-15.
- Jonas, E. Schulz-Hardt, S. Frey, D. Thelen, N. (2011). Confirmation bias in sequential information search after preliminary decisions: an expansion of dissonance theoretical research on selective exposure to information. *J Pers Soc Psychol*. 80 (4), 557-71.
- Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.
- Kahneman, D. & Tversky, A. (1972). Subjective probability: A judgment of representativeness. *Cognitive Psychology*, 3, 430-454.
- _____, (1973). On the Psychology of Prediction. *Psychological Review*, 80(4), 237–51. .
- _____, (1979). Prospect Theory: An Analysis of Decisions Under Risk. *Econometrica*, 47(2), 263– 91.
- _____, (2000). *Choices, values and frame*. New York: Cambridge University Press.
- Kahneman, D., Slovic, P., Tversky, A. (1982). *Judgment Under Uncertainty: Heuristics and Biases*. New York: Cambridge University Press.
- Kahneman, D. & Tversky, A. (1996). On the reality of cognitive illusions. *Psychological Review*, 103(3), 582-591.
- Karalias, G. (2010). Obsolete semiconductors: A proactive approach to End-of- life. *Military embedded Systems*, 6 (1). Available on: <http://mil-embedded.com/articles/obsolete-semiconductors-proactive-approach-end-of-life/>
- Kardes, F. R. & Kalyanaram, G. (1992). Order-of-entry effects on consumer memory and judgment: an information integration perspective. *Journal of Marketing Research*, 29(3), 343-357.
- Kelman H. C. (1961) Processes of opinion change. *Public Opinion Quarterly*. 25, 57-78.
- Kirscht, J. P., Haefner, D. P., Kegeles, S. S., Rosenstock, I. M. (1966). A national study of health beliefs. *Journal of Health and Human Behavior*, 7, 248-254
- Krajewski, M. (2014). The Great Lightbulb Conspiracy. The Phoebus Cartel engineered a shorter-lived lightbulb and gave birth to planned obsolescence. *Spectrum: IEEE magazine*, 51(10) , 56–61.

- Krajewski, M. (2014). Fehler-Planungen: Zur Geschichte und Theorie der industriellen Obsoleszenz. *TG Technikgeschichte*, Seite 91 – 114.
- Kreiss, C. (2014). Geplanter Verschleiss Wie die Industrie uns zu immer mehr und immer schnellerem Konsum antreibt – und wie wir uns dagegen wehren können, Berlin: Europa Verlag Berlin.
- Kurz, R. (2015). Quality, obsolescence and unsustainable innovation. *Econviews*, 28(2), 511-522.
- Leibenstein, H. (1950). Bandwagon, Snob, and Veblen Effects in the Theory of Consumers Demand. *The Quarterly Journal of Economics*, 64(2), 183-207.
- Lund, F. H. (1925). The psychology of belief. *Journal of Abnormal and Social Psychology*, 20, 63-196.
- Malhotra, N. K. (2011). *Pesquisa de marketing: foco na decisão*. 3. São Paulo: Pearson Prentice Hall.
- Martinez, A. L. (2007). Analysts' Optimism and Selection Bias. *Brazilian Business Review*, 4(2), 103-113
- Mason, R.S. (1981). *Conspicuous Consumption: A Study of Exceptional Consumer Behaviour*. Aldershot. Gower Publishing Ltd.
- Mason, R.S. (1992). Modelling the Demand for Status Goods. *SV - Meaning, Measure, and Morality of Materialism* (pp. 88-95). Provo, UT: Floyd W. Rudmin and Marscha Richins.
- Maycroft, N. (2009) *Consumption, planned obsolescence and waste*. Working Paper. University of Lincoln. Available on: <http://eprints.lincoln.ac.uk/2062/1/Obsolescence.pdf>
- McCollough, J. (2007). The Effect of Income Growth on the Mix of Purchases Between Disposable Goods and Reusable Goods. *International journal of Consumer Studies*, 31, Issue 3, 213 -219.
- McCracken, G. (1986). Culture and Consumption: A Theoretical Account of the Structure and Movement of the Cultural Meaning of Consumer Goods. *Journal of Consumer Research*, 13(1), 71-84.
- Mick, D. G. (1986). Consumer Research and Semiotics: Exploring the Morphology of Signs, Symbols, and Significance. *Journal of Consumer Research*, 13(2), 196-213.
- Miller, C. M, McIntyre, S. H, Mantrala, M. K. (1993). Toward formalizing fashion theory. *JMR. Journal of Marketing Research*, 30(2), 142.
- Midgley, M. (1983). *Animals and Why They Matter*. Georgia: University Press.

- Morewedge, C. K. & Kahneman, D. (2010). Associative processes in intuitive judgment. *Trends Cogn Sci*, 14(10), 435-440.
- Mortin, C. (2011). Neuromarketing: the new science of consumer behavior. *Springer Science + Business Media*, 131-135.
- Mullainathan, S. (2002). A Memory-Based Model of Bounded Rationality. *Quarterly Journal of Economics*, 117 (3), 735–774.
- Mullainathan, S. & Eldar S., S. (2013). *Why Having Too Little Means So Much*. New York: Henry Holt.
- Muramatsu, R. (2006). Emotions in Action: an inquiry into the explanation of decision-making in the real economic world. Retrieved from: <http://hdl.handle.net/1765/8107>
- Muramatsu, R. (2015). Lições da Economia Comportamental para o Desenvolvimento e Pobreza. Àvila, F. & Bianchi A. M. (Orgs.). Guia de Economia Comportamental e Experimental. São Paulo. Available on: <http://www.economiacomportamental.org/guia-economia-comportamental.pdf>
- Obsolescence-programmee (2012). Les bas nylon de DuPont de Nemours. Available on: <http://obsolescence-programmee.fr/exemples-symboliques/bas-nylon-de-dupont-de-nemours/>
- O'Donoghue, Ted & Rabin, M. (1999). Doing It Now or Later. *American Economic Review*, 89 (1), 103-124.
- O'Guinn, T. & Shrum, L. J. (1997). The Role of Television in the Construction of Consumer Reality. *Journal of Consumer Research*, 23(4), 278-294
- Packard, V. (2011). *The Waste Makers*. New York: Ig Publishing.
- Pineda, J.A.S & Salmoral, M. P. (2017). *A Juridical Theory of Planned Obsolescence*. Available at. SSRN: <https://ssrn.com/abstract=2966052>
- Prakash, S., Stamminger, R., Oehme, I. (2015). Faktencheck Obsoleszenz: Analyse der Lebens-und Nutzungsdauer von ausgewählte Elektro-und Elektronikgeräten, in Brönneke, T., Wechsler, A. (Eds.). *Qualitätsprodukte oder geplanter Verschleiß?* (pp. 83-106). Baden-Baden: Nomos.
- Ramos, P., Ramos, M. M., Busnello, S. J. (2005). *Manual prático de metodologia da pesquisa: artigo, resenha, projeto, TCC, monografia, dissertação e tese*. Blumenau: Acadêmica.
- Redden, J. P. (2007). Hyperbolic Discounting. In Baumeister R. F. & Vohs K. D. *Encyclopedia of Social Psychology*. Thousand Oaks, CA: Sage
- Reischauer, C. (2011). *Vermarkten für den Müll?* Absatzwirtschaft (pp. 18-25) Düsseldorf: Verlagsgruppe Handelsblatt, S.19

- Reperio Revista de Arte, Breve História do Nylon (2013). Available on: <https://reperiorevistadearte.wordpress.com/2013/07/29/breve-historia-do-nylon/>
- Richardson, R. J. (1989). *Pesquisa social: métodos e pesquisa*. 2. São Paulo: Atlas.
- Rogers, E. M. (1983). *Diffusion of innovations*. New York: Free Press.
- Reuss, J. & Dannoritzer, C. (2013). *Kaufen für die Müllhalde*. Das Prinzip der geplanten Obsoleszenz. Freiburg: Orange Press.
- Sandborn, P. (2007). Software obsolescence – complicating the part and technology obsolescence management problem, in *IEEE Trans on Components and Packaging Technologies*. 30(4)
- Saunders, J. & Jobber, D. (1994). Product Replacement: Strategies for simultaneous Product Deletion and Launch. *Journal of Product Innovation Management*, 11(5), (pp. 433-450)
- Schridde, S. & Kreiss, C. (2013). Geplante Obsoleszenz: Entstehungsursachen, Konkrete Beispiele, Schadensfolgen, Handlungsprogramm. *Gutachten im Auftrag der Bundestagsfraktion Bündnis 90*. Berlin: Die Grünen.
- Schumpeter, J. A. (1911). *Theorie der wirtschaftlichen Entwicklung*. 4. Berlin: Duncker&Humblot.
- Simon, H. A. (1955). A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), 99-118.
- Simon, H. A. (1957). *Models of man*. New York: John Wiley and Sons.
- Sbicca, A. (2014). Heurísticas no Estudo das Decisões Econômicas: Contribuições de Herbert Simon, Daniel Kahneman e Amos Tversky. (pp. 579-603). São Paulo: Available on: <http://dx.doi.org/10.1590/S0101-41612014000300006>.
- Slade, G. (2007). *Made to Break – Technology and Obsolescence in America*. Cambridge\ London: Harvard University Press.
- Shane, F., Loewenstein, G., O'Donoghue T. (2011). Time Discounting and Time Preference: A Critical Review. *Journal of Economic Literature*, 40(2), 351-401.
- Sharot, T., Korn, C. W., Dolan, R. J. (2011). How unrealistic optimism is maintained in the face of reality. *Nature Neuroscience*, 14, 1475–1479.
- Shepperd, J.A, Carrol, P., Grace, J., Terry, M. (2002). Exploring the Causes of Comparative Optimism. *Psychologica Belgica*, 42, 65-98.
- Slovic, P. (1972). Psychological Study of Human Judgment: Implications for Investment Decision Making. *The Journal of Finance*, 27(4), 779-799.
- Sirgy, M. J. (1982), Self-Concept in Consumer Behavior: A Critical Review. *Journal of Consumer Research*, 9(3), 287-300.

- Solomon, M. R. (1983). The Role of Products as Social Stimuli: A Symbolic Interactionism Perspective. *Journal of Consumer Research*, 10(3), 319-329
- Summerfield, C. & Tsetsos, K. (2015). Do humans make good decisions? *Trends in Cognitive Sciences*, 19(1), 27-34.
- Stocking, G.W & Watkins, M.W. (1946). Cartels in Action, Twentieth Century Fund. XII p. 533 p., 4 \$. (1951). Bulletin De L'Institut De Recherches économiques Et Sociales, 17(5), 562-562. doi:10.1017/S0770451800046327
- Strunk, D.R, Lopez, H., DeRubeis, R. J. (2005). Depressive symptoms are associated with unrealistic negative predictions of future life events. *Behav Res Ther.* 44(6), 861-82.
- Thaler, R. H. (1985). Mental accounting and consumer choice. *Marketing Science*, 4, 199-214.
- _____. (1999). Mental accounting matters. *Journal of Behavioral Decision Making*, 12, 183-206.
- _____. (1979). *Toward a positive theory of consumer choice*. New York: Cornell University Press.
- Thaler, R. H. & Sustain, C. (2008) *Nudge – Improving decisions about health, wealth and happiness*. Yale: Yale University Press.
- Thaler, R. H. & Shefrin, H. M. (1981). An economic theory of self control. *Journal of Political Economy*, 39.
- Thorstein V. (1899). *The Theory of the Leisure Class*. An Economic Study of Institutions. Introduction John Kenneth Galbraith. Boston, MA: Houghton Mifflin. ISBN 978-0-395-14008-6.
- Torresen, J. & Lovland, T. A. (2007). Parts obsolescence challenges for the electronics industry-IEEE. *Conference on Design and Diagnostics of electronics Circuits and Systems*. Cranfield University (pp 225)
- Toner, J., Montero & B.G., Moran, A. (2014). Considering the role of cognitive control in expert performance. *Phenomenology and the Cognitive Sciences*. 14(4), 1127-1144.
- Tversky, A. & Kahneman, D. (1973). Availability: a heuristic for judging frequency and probability. *Cognitive Psychology*, 5, 207-222.
- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality & Social Psychology*, 39 (5), (pp. 806 -820).
- _____. (1982). Unrealistic optimism about susceptibility to health problems. *Journal of Behavioral Medicine*, 5, 441-460.
- _____. (1983). Reducing unrealistic optimism about illness susceptibility. *Health Psychology*, 2, 11-20.

_____. (1984). Why it won't happen to me: Perceptions of risk factors and susceptibility. *Health Psychology*, 3, 431-457.

Appendix

Appendix A - Questionnaire sent to Control Group

- 1 How often do you buy a new mobile phone?
Between 1 and 2 years
Between 6 months and 1 year
Less than 6 months
More than 2 years
- 2 Why did you discarded your old mobile phone?
It broke. There was no repair.
Had problems with some functions
It was working, but I would like a more modern with more functions
- 3 What did you do with your old phone?
I threw away
I sold
I kept
I donated
- 4 A fantastic new mobile device has been released in the market, what is more likely to happen?
Buy the new cell phone even though it has an almost new
Buy the phone because I deserve it
Do not buy the phone because I do not need it
Buy the new phone, because the device I have today is no longer working well
- 5 In the next 12 months, how likely is it to discard your mobile device?
Very likely
Somewhat Likely
Unlikely
- 6 In the next 24 months, how likely are you to discard your mobile device?
Very likely
Somewhat Likely
Unlikely
- 7 How likely are you to buy a mobile phone instead of investing in a simple financial investment?
Very likely

Somewhat Likely

Unlikely

- 8 How do you see the political and economic scenarios in Brazil in the next 2 years?

Best

Worse

The same current scenario remains

Improves and stabilizes

- 9 Do you have a favorite brand of mobile phone?

Yes

No

- 10 In your family / social circle, is there a favorite mobile phone brand?

Yes

No

- 11 How likely is it that you will buy a mobile phone with the same brand as a friend or family member?

Very likely

Somewhat Likely

Unlikely

- 12 How likely is it that you buy a cell phone from the same brand you have had?

Very likely

Somewhat Likely

Unlikely

- 13 How much are you willing to pay for a new cell phone?

Up to R \$ 500.00

From R \$ 501,00 to R \$ 1,000,00

From R \$ 1001,00 to R \$ 2,000.00

Above R \$ 2,000.00

- 14 In your opinion, how long should a cell phone last?

Up to 1 year

From 2 to 3 years

3 to 5 years

over 5 years

- 15 How much would you be willing to pay for the repair of your current mobile device?

Up to R \$ 100.00

Between \$ 101 and \$ 300

Between R \$ 301,00 and R \$ 500,00

More than R \$ 500,00

- 16 How do you feel when you buy a new mobile?

Satisfied with my purchase because I made a good deal.

Satisfied with my purchase because I will be well seen and accepted in the community that I am part of or want to be part of.

Guilty, because I spent what I did not have, or more than I should have.

Guilty because it was a thoughtless decision

- 17 Still regarding the price of a cell phone currently ...

The more expensive the phone costs, the longer it should work.

The cheaper the phone costs, the less time it should work

The more expensive the cell phone, the higher the cost of maintenance, but the better service network

The cheaper the phone, the higher the cost of maintenance.

When a cheap cell phone breaks down, it's better to buy another one than try to fix it.

Appendix B - Questionnaire sent to Treatment Group

- 1 How often do you buy a new mobile phones?
 - Between 1 and 2 years
 - Between 6 months and 1 year
 - Less than 6 months
 - More than 2 years

- 2 Why did you discarded your old cell phone?
 - It broke. There was no repair.
 - Had problems with some functions
 - It was working, but I would like a more modern with more functions

- 3 What did you do with your old phone?
 - I threw away
 - I sold
 - I kept
 - I donate

- 4 Imagine that your current cell phone broke, what would you do?
 - I would seek technical assistance
 - Would buy a new, but of the same brand
 - Would buy a new, cheaper than the previous one
 - Would buy a new one, more expensive than the previous one

- 5 Imagine that you made some extra money and a fantastic new cell phone was released, what is more likely to happen?
 - I would buy several things from the money I earned
 - I would pay debts
 - Would invest
 - I would buy the phone that was released

- 6 Currently in Brazil, there are low, medium and high risk investments such as: CDB & Tesouro Direto, Fundos de Investimentos e Ações. In the next 12 months, how likely are you to change handsets?
 - Very likely
 - Somewhat Likely
 - Unlikely

Currently in Brazil, some investments can value between 7.5% and 12%
 7 per year. In the next 24 months, how likely is it that you will discard your mobile device?

Very likely

Somewhat Likely

Unlikely

Regarding the investments mentioned above, with a conservative analysis, how do you understand the statement below? "The average cost of a cell
 8 phone today is \$ 1,000.00 If you invest this money in a financial application with a yield of 7.5% not considering taxes, you will have in two years 1155.63. If you buy a cell phone, you will get 0 "

I know

I was not aware until now

I'm not aware

In relation to the Brazilian economic and political scenario, how do you
 9 understand the statement below? "We live in a political instability that reflects in the economic scenario that can increase violence and unemployment"

I know

I was not aware until now

I'm not aware

10 When someone talks about a high quality cell phone, what is the brand you remember immediately?

Apple - Iphone

Samsung - Galaxy

I do not have a favorite brand

Other (please specify)

11 In your family circle / friends, what is your favorite cell phone brand?

Apple - Iphone

Samsung - Galaxy

I do not have a favorite brand

Other (please specify)

Imagine the scenario below: You and someone from your family or friend
 12 goes shopping. He / she will buy a cell phone and you also need one. He / she buys a specific brand. How likely would you buy the same brand?

Very likely

Somewhat Likely

Unlikely

- 13 How likely is it that you buy a cell phone with the same brand you have?

Very likely

Somewhat Likely

Unlikely

- 14 How much are you willing to pay for a mobile phone of your favorite brand?

Up to R \$ 1,000.00

From R \$ 1001,00 to R \$ 2,000.00

From R \$ 2,000 to R \$ 3,000.00

Above R \$ 3,001.00

- 15 In your opinion, how long should a cell phone last?

Up to 1 year

From 2 to 3 years

From 3 to 5 years

Above 5 years

- 16 How much would you be willing to pay for the repair of your current cell phone? Consider how long you bought it and how much you bought it.

Up to R \$ 100.00

From R \$ 100,00 to R \$ 500,00

From R \$ 501,00 to R \$ 1,000,00

Above R \$ 1,000

- 17 How do you feel when you buy something you did not need?

Satisfied, I'm glad to buy

Guilty, I spent money needlessly

Satisfied but could have controlled my momentum

Guilty, because besides buying something I did not need, I still made a debt.

- 18 How do you feel when you buy a new handset from your favorite brand?

Satisfied with my purchase because I made a good deal

Satisfied with my purchase because I will be well seen and accepted in the community of which I am part or want to be part

Guilty because I spent what I did not have or more than I should

Guilty because it was a thoughtless decision

19 Still regarding the price of a cell phone currently ...

The more expensive the phone costs, the longer it should work.

The cheaper the cell phone, the less time it should work

The more expensive the phone, the higher the cost of maintenance, but
better service network

The cheaper the phone, the higher the cost of maintenance.

When a cheap cell phone breaks, better to buy another than try to fix

