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Innovation Intensity and Adoption at the Base of the Pyramid Market: A Study of Household Appliances

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ABSTRACT

The paper analyzes the innovation intensity and adoption characteristics at the base of the pyramid market. The innovation intensity is configured as radical and incremental, while the innovation adoption is configured as early and tardy. As an empirical approach it was conducted a study type *survey*. Data analysis is based on non-parametric statistics. The results indicate that the base of the pyramid consumers is characterized by adopting incremental innovations tardily, as pointed out by the literature. Furthermore, it was also observed that women have greater decision-making power in the families of this segment.

KEY-WORDS: Bottom of the Pyramid. Innovation Adoption. Innovation Intensity.

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Intensidade e Adoção da Inovação no Mercado da Base da Pirâmide: um Estudo com Produtos Eletrodomésticos

RESUMO

No artigo, analisam-se as características de intensidade e adoção da inovação no mercado da base da pirâmide. A intensidade da inovação configura-se como radical e incremental, enquanto a adoção da inovação, como inicial e tardia. Como recorte empírico, foi realizada uma pesquisa do tipo *survey*. A análise dos dados fundamenta-se na estatística não paramétrica. Os resultados apontam que os consumidores da base da pirâmide caracterizam-se por adotar inovações incrementais de forma tardia, conforme aponta a literatura. Ademais, foi possível concluir também que as mulheres têm maior poder de decisão nas famílias desse segmento.

PALAVRAS-CHAVE: Base da Pirâmide. Adoção da Inovação. Intensidade da Inovação.

1 INTRODUCTION

The intense consumption by the population belonging to the base of the pyramid (bottom of the pyramid - BOP) was considered highly unlikely, since poor people were used to consuming only to meet their basic needs, which caused the low-income populations to be disregarded within the market consumption in former times (Barros & Rocha, 2009). Now this scenario is changing, since besides buying their basic needs, the BOP consumers are also looking for products and services with higher added value and they are revealing to be a potential consumer market which has became very attractive for large companies (Varadarajan, 2009; Viswanathan, Shultz & Sridharan, 2014). This relationship is bidirectional, that is, not only the consumers have been looking for more value, but also companies have begun to offer such added value, once they feel that the upper classes segment have become saturated (Nogami , Vieira & Medeiros, 2012).

During and after the 2008 financial crisis, (Kaplinsky & Keynes, 2011), the developed economies such as The United States, Japan and Western European countries, not only suffered more than those of the emerging countries such as Brazil, China and India, but also their consumer market have reached a saturation point. Consequently, their large companies are considering investing in the unexplored base of the pyramid market of the emerging economies (Nakata & Weidner, 2012).

Although studies on the low-income population consumption were not very recent, scientific researches carried out aiming at understanding this population consumer behavior are not very common yet. Furthermore, there is no academic integration among researchers of this theme in Brazil (Nogami & Pacagnan, 2011; Hemais, Casotti & Rocha, 2013), taking as an example: the terms - *'base of the pyramid consumers'* and *'low-income consumers'* are considered synonyms in the Brazilian literature. As proposed by Rocha e Silva (2008), studies about the meaning of consumption among low-income consumers and their behavior at the sale point should be intensified, as well as the understanding of how the innovations diffusion and adoption occur in the low income consumers market – it is fundamental to make progress in the studies of this area (Hemais et al., 2013).

Therefore, the aim of this paper is to analyze how to configure the innovation intensity and the innovation adoption at the base of the pyramid market. There are a number of gaps in the studies related to the base of the pyramid market (Berti&Bitencour, 2012). Having in view that this market have reemerged more strongly in recent years, there are many factors that justify the great quantity of these gaps: (i) the focus of most companies are still on the market that demonstrates greater purchasing power; (ii) unawareness about this consumer behavior still inhibits companies' investments in the base of the pyramid. (iii) there is shortage of studies in the Research & Development for products and services directed to these consumers. (iv) to achieve larger profits, the focus should be "quantity, without losing quality", as a criterion, and even, (v) the prejudice itself inhibits more business to this market. These aspects, anyway, directly or indirectly, may result in less product innovations to the BOP market (Nogami, Vieira & Medeiros, 2013).

Conventionally, the concept of innovation is related to areas connected to technology, modernity, electronics and "hi-tech products" (Kuczmarski, 2003). Being so, this conception is often associated to the idea of production high costs, research and development which reflects on higher prices to consumer (Wolfe, 1994; Nakata & Weidner, 2012). However, researching and managing the innovation in the academy and in the market, are actions that go far beyond the work in R&D laboratories spread in universities, large companies and in the technology centers.

In view of all these gaps, the main contribution of this article is the decreasing in the distance between the development of innovative products for the BOP market and the adoption of such innovations. This gap exists once it is traditionally accepted that only high-income consumers can buy innovative products, thus innovation hardly reaches the BOP (Viswanathan & Sridharan, 2012). In general, the literature on innovation at the base of the pyramid points out several forms of innovation, mainly in the process and in the business model (Prahalad & Hart 2002), in other words, in the organization (Prahalad, 2005). Considering that the product development is an essential activity for the market-based economy, and that the welfare of the consumers of the base of the pyramid requires innovations in the

accessibility of goods and services, there is a substantial gap in the literature in regard to the product development for the base of the pyramid market (Anderson &Billou, 2007; Viswanathan& Rose, 2010). Therefore, the question that directs the present study is - How the intensity and the innovation adoption are configured at the base of the pyramid market?

2 INNOVATION INTENSITY AT THE BASE OF THE PYRAMID

The innovation intensity is directed related to the way it is measured. In other words, what means that a product is new, is related to the way of measuring the innovation. In general, innovation is not measured directly, but indirectly, i.e., it is commonplace to use other measures to measure innovation, being the most common: the number of patents or the funds invested in R & D to use measuring references for innovation (Moreira &Queiroz, 2007). A broad but direct way of measuring innovation is to evaluate the innovation generation process, the innovation diffusion process and the innovation incorporation process in both ways, qualitatively and quantitatively,(Rogers, 2003).

As for the measuring way, the innovation intensity is customarily classified as incremental and radical. Radical innovations are represented by a product, process or organization which presents unprecedented performance or already known characteristics that provide significant enhancements in the performance or cost (Leifer, O'Connor & Rice, 2002). Radical innovation transforms the relationship between consumers and organizations; restructure the market economic aspects, destabilizes existing markets and gives rise to completely new products category.

Radical innovation presents theoretical convergence with the concept of creative destruction presented by Schumpeter (1984). This concept is developed in an economic context highly competitive and monopolized, a result of the system ruled by the capitalist logic. In order that small and new organizations are enabled to enter the market and compete with established and large organizations, the newcomers need to creatively destroy the product or the already known business model, distributing the market participation among more players and providing

higher competitiveness index (Schumpeter, 1984). Although the radical innovation is more valued and causes greater impact, considering its complexity, only 6% to 10% of innovations are quite radical (Tidd, Bessant & Pavitt, 2008).

Other point of view on the same concept is the incremental innovation that occurs gradually and periodically with the purpose of achieving long-term goals (Anderson &Billou, 2007). An incremental innovation can be developed after a radical innovation. Bearing in mind that, when a radical innovation occurs it creatively destroys a product, a process, an organization or a market, incremental innovation provides continuity to the concept initially inserted by radical innovation; in this way, the incremental innovation occurs more frequently and cause lower impact than the radical innovation (Anderson &Billou, 2007). Therefore, the incremental innovation is characterized by adaptations, in order to be adjusted to the consumption needs. Moreover, one can consider that the innovation intensity is prepared in a *continuum*, whose extremes are composed by incremental and radical innovation.

Prahalad (2005) presents 12 principles of innovation for large companies, interested in the base of the pyramid market. These principles are shown in a summarized way, in Chart 1. According to the author, a scale combination, technology, price, sustainability and usability are the components to develop innovations in this market.

PRINCIPLES OF INNOVATION AT THE BASE OF PYRAMID MARKET	CHARACTERISTICS
1 Affordable prices	Quantity
2 Hybrid Technology Solutions	Consumer
3 Economies of Scale, Large Quantities, Worldwide availability	Quantity
4 Resources Maximization (Sustainability)	Quantity
5 Functionality Benefit	Consumer
6 Innovation in the process is as important as innovation in the product	Quantity
7 Handling Facility	Consumer
8 Consumer's Education	Consumer
9 Product adaptation to hostile environments	Consumer
10 "Friendly" Appearance(interface)	Consumer
11 Large Distribution	Quantity
12 Even the BOP being heterogeneous, it must have large diffusion and adoption	Quantity

Chart 1: 12 principles of innovation at the base of pyramid market

Source: Adapted from Prahalad (2005)

When making an analysis using other point of view, it is possible to see that two main components orient all the 12 principles: the quantity and the consumer. Regarding quantity, the prices for this market have to be accessible, since they have low profit margins (1), as well as maximizing the use of resources is needed, since the planet is not able to provide supply for the entire population from the base of the Pyramid in the same way it did for the wealthy population in the last century (4). The economy of scale is the focus because low-income consumers are spread across the world (3), thus the wide dissemination is a necessary requirement (11), even the BOP having heterogeneous characteristics. The principle (12) presents a paradox, since the BOP characteristics are heterogeneous, but, as the focus is on quantity homogeneous similarities are sought aiming at achieving greater amount of consumers. Lastly the principle (6) suggests process innovation, in order to optimize the production and distribution processes, maximizing resources and reducing the final price, in other words, the focus must be on the quantity.

The second component that guides the principles of innovation for the BOP market is the characteristics, the needs and the behavior of low-income consumers. In general, the product or service functionality is the benefit that the BOP's consumer seeks (5), the easiness to handle (7) and the suitability for environments presenting uneven surfaces in the floor, with little physical space and exposed to moisture and sunlight (9). Therefore, the product appearance must be user friendly, holds a pleasant interface (10) and it is essential to educate the consumer on the use of the products (8). Finally, the technology must be hybrid (2), i.e. the most advanced technology must be used sparingly as it may increase the price of the product, besides the fact that, at certain moments, the consumer may not be able to understand its use, so it is required the hybridization of advanced technologies and less advanced technologies.

For this purpose, as shown by Prahalad (2006), innovation for low income consumers can be metaphorically compared to a sandbox – sand – due to its fluidity characteristics, able to displace borders; box, because it requires rigidly defined segmentation divisions - since low income has a huge population with consequent different segmentations around the world.

Thus, it is not possible to develop an innovation strategy for the whole BOP, but the adjustments must be made for the respective market segmentations; being so, the innovation is characterized as incremental (Prahalad, 2006; Anderson & Billou, 2007).

Rescuing the concepts of innovation intensity, i.e. how much radical or how much incremental the innovation is, it is unquestionable that radical innovation plays a fundamental role in formatting the market and in the market guidelines; however, companies which intend to work in the bottom of the pyramid market cannot "afford the luxury" to disregard the incremental innovation in the products portfolio (Varadarajan, 2009). The incremental innovations are suitable for the low-income market, since they appear with adaptations, enhancements, improvements, enlargements or reductions, incorporating new resources that provide additional benefits. Thus, even in small proportions, the incremental innovations can be reflected subsequently in radical innovations (Kuczmarski, 2003; Varadarajan, 2009).

As the base of the pyramid consumer does not seek exclusivity, but inclusion in the consumer society (Azevedo &Mardegan Jr., 2009), the products to low income consumers do not have to bring the latest technology on the market, with the best quality possible, but they must present sufficient quality to meet the consumer needs. This factor certainly increases the rate of innovations adoption. As the low-income market is not characterized as a high-tech sector, radical innovation is not common in it (Nascimento, Yu & Sobral, 2008). No company positioned for low-income market conducts advanced research in new technologies to assign them to popular products. This technology hybridization happens to allow the final product prices be affordable for consumers.

3 INNOVATION ADOPTION AT THE BASE OF THE PYRAMID

As this research was directed to the base of the pyramid market, the meaning of innovation transcends the connotation of technological determinism and begins to take into account the relationships with social

constructionism. In this perspective, the innovation social character most differs from the technological determinism approach, because the innovation with social character can take some degree of relativism (Nogami et al., 2013). The term social, in "social innovation" involves not only the social, but also cultural, human, political and organizational aspects, moving away from the technological determinism and approaching the multi and interdisciplinary character (Prajogo & Ahmed, 2006).

Thus, a phenomenon may be considered as an innovation in a region, in an environment or in an organization, and simultaneously in other sites (Nogami et al., 2013). However, the innovation concept in products for high-income consumers is different from the innovation concept in products for low-income consumers, further strengthening the variability of this concept (Varadarajan, 2009; Antioco & Kleijnen, 2010). Then, the intensity, the adoption and diffusion of innovation should follow the market behavior accordingly.

The innovation is widespread based on the consumers' characteristics, the product attributes, the social context and the marketing environment. Therefore, diffusion can be defined as the process where the innovation is communicated through certain channels, over the time, among the social system members (Rogers, 2003; Antioco & Kleijnen, 2010). The communication channels for innovation - which are not necessarily the media - are the processes by which participants create and share information with the other party to achieve mutual understanding. In this sense, the present study seeks to interact with the areas of knowledge embracing Marketing and Innovation, specifically with respect to consumer behavior in relation to the innovation intensity and to the innovation adoption.

The temporal dimension that involves the innovation diffusion comprises: the innovation decision process, the ability of individuals to adopt innovation and the rate of the innovation adoption. The first involves knowledge, persuasion, decision, implementation and the innovation confirmation, then, it is possible to make a decision about innovating or not. This step is related more to researchers and to development companies, responsible for product development areas.

Then it is necessary to know the innovation adopters categories, divided into five categories: - innovators (2.5%), early adopters (13.5%), early majority (34%), tardy majority (34%) and the latecomers (16 %). These tracks theoretically presented by Rogers (2003), are normally quite used to describe the innovation adoption curve. Although they are not absolute figures, they give directions to guide the companies' management. Factors that may drive up the innovation adoption among consumers are: respect among peers; the opinion-leaders influence in the social environment (Rogers, 2003); finally, the innovation rate, defined as the relative speed at which the members of the social system adopt the innovation. Precisely because this speed is relative, it requires knowing what the social system is, regarding the context - in this case, the low-income market.

Other factors that provide effectiveness to the innovation adoption are the quantity and the quality of the information transmitted to potential adopters. It is also important the presence of a sound content in order to reduce the uncertainty and increase the compatibility between those who offer innovation and the potential adopters. The opposite is also true, i.e., little information increases the uncertainty, increases the incompatibility and offer lower adoption rates (Antioco & Kleijnen, 2010; Nakata & Weidner, 2012).

Among the empirical innovation cases in household appliances for the low income consumers, it can be mentioned the stove (Prahalad, 2012) and the washing machine (Sobral, Oliva, Yu, Hildebrand & Santos, 2007). In the stove case, it was developed a product smaller than the conventionally known (with four or six burners); a stove with only one burner was developed to be used by thousands of families, who still live in the rural area of India, without means to heat their meals.

The fact that the product is small allows the sharing among family and neighbors. Another advantage is the lightweight, which provides portability to the product; for this particular public it can be a determining factor of buying it or not, due to the transportation difficulties. If the stove is portable it facilitates the consumers' mobility when buying it. One last innovative feature in this stove is the use of biomass as energy source, a combustion process generated from organic material which has as an

advantage the low cost, once it allows the reuse of waste and pollutes less than fossil fuels.

Another piece of home appliance products presenting specific innovations is the washing machine (Sobral et al., 2007). Considering the gap between automatic and non-automatic (small laundry sinks), it was developed a machine less expensive than the automatic machines but presenting the centrifugation function, which is absent in the non-automatic machines (small laundry sinks). According to Sobral et al. (2007), besides centrifugation, other innovative features were identified in this product directed to the BOP. Instead of digital electronic panels, mechanical buttons describe the functions; machine covers are transparent because it was identified in previous researches that housewives enjoy seeing the clothes being washed. The design transmits more modernity and strength, unlike the small laundry sinks that seem to be fragile; and the machine feet are adjustable, ideal for adaptations on uneven surfaces (floor) in houses located in the outskirts of large cities and rural areas.

In addition, the adoption and the acceptability refer to the necessary adjustments that have to be made in the products and services, so that they are able to meet the peculiar needs of the BOP consumers. It is not enough lowering prices and reduce attributes of products positioned to high class, and then offer them to the low-income consumers, since the lifestyle and buying behavior of these low-income consumers should be taken into consideration (Varadarajan, 2009) Ultimately, consumer awareness is also crucial to the adoption because, considering that the access and the understanding of traditional communications might not be so accessible to the BOP consumers (Barki & Parente, 2006), companies also need to innovate in the way they communicate their products and services (Anderson & Billou, 2007).

4 METHODOLOGICAL PROCEDURES

For conducting this study, it was carried out a data collection type *survey*, in a city of southern Brazil, asking 400 interviewees to answer to the previously prepared questionnaire questions, of which 390 were considered as valid. The other questionnaires were incomplete or presented

ambiguous data. In the researched town it was established six convergence points in the format of commercial street hubs where there are large concentration of retail stores, public transportation stop points *(buses stop, trains stop, subway stop)* as well as banks, among other elements that characterized the venue as a place of people concentration and pedestrian traffic (Parente , Miotto & Barki, 2007). Moreover, these points were chosen based on the people income level. This criterion was taken into account, considering the data from the Brazilian Institute of Geography and Statistics census (IBGE) 2010, that turned possible tracking which city districts have low-income families. Therefore, the research six points collection also took this criterion into account.

Due to the low income and the base of the pyramid magnitude, misunderstandings are common when defining the consumers in these research types (Nogami & Pacagnan, 2011). For this study, the basic point to define the target public was the monthly family income between R$ 700.00 and R$ 2,500.00. As for the selected products to make up the research, it was chosen the refrigerators (fridges), washing machines, stoves and microwave ovens. Such products are considered household appliances of primary necessity, being present in researches conducted by IBGE, the National Research by Household Sample (PNAD) and the Household Expenditure Survey (POF). These products were also chosen because there were more than ten different brands on the market. The more competitive market provokes greater probability of innovations development (Levitt, 1990).

The language, the size, the order and the questions approach were planned in details, considering that the task of collecting data from low-income consumers is more difficult, once individuals have lower education level and lower reading habit. Thus, the questionnaires were applied in a way that the interviewees did not need to answer the questionnaire (form), alone, by themselves, that is, all the questions were orally formulated to the interviewees, to ensure higher reliability of the data (Rocha & Silva, 2008).

This personal and individual data collection option, although being more labor intense than providing online questionnaires, holds the advantage of guaranteeing greater sample control, allowing the reduction of

random error besides providing greater reliability on data collection. On the other hand, because it involves further financial efforts, more time and mainly further efforts in view of the complexity in applying each questionnaire, it was sought to minimize the number of questions in order to seek greater number of valid questionnaires, since the research was conducted on the streets. For this purpose, three pre-tests were performed until a suitable questionnaire was achieved. Moreover, due to the difficulty of the questions interpretation, it was developed a response card to help the respondents during the collection, as pointed out in Figure 1 below.

ANSWER CARD

5	4	3	2	1
COMPLETELY AGREE	**PARTIALLY AGREE**	**NEITHER AGREE NOR DISAGREE**	**PARTIALLY DISAGREE**	**COMPLETELY DISAGREE**

5	4	3	2	1
YES FOR SURE	**PARTIALLY YES**	**SOMETIMES YES, SOMETIMES NO**	**PARTIALLY NO**	**NO FOR SURE**

Figure 1: Answer Card
Source: Elaborated by authors

Given that this card resulted in appointments for each point in the scale, the variables of analysis are not considered intervallic as they are conventionally treated in the research in marketing and in the marketing research; they are ordinal variables, as pointed out by Gaito (1980). To assess the research results it were first observed the answers distributions of the 390 individuals in each of the questionings carried out. Then the answers distributions were assessed according to the socio and demographic characteristics, and hypothesis tests were performed in order to identify differences between the distributions by interest group: gender, income and age-bracket.

To analyze the results, non-parametric tests were performed, according to Mann-Whitney and Kruskal-Wallis, (Siegel, 1975). Both tests present as null hypothesis, the equality of the levels studied. The use of nonparametric tests is necessary when the assumptions regarding the data distribution (specific and known, in general, normal) for the parametric tests - most commonly used - are not valid (Neter, Kutner, Nachtsheim & Wasserman, 1996). Considering that the obtained response with the research is of ordinal type, not intervallic, there is the indication for the use of these tests. The Mann-Whitney test was used to test the hypotheses for the gender and income groups. However in order to assess the differences among ages, in view of the number of groups in each category, it was used the Kruskal-Wallis test. As it usually occurs in the variance analysis, this test result indicates the rejection, or not, of the null hypothesis. When there is rejection, there is no indication about which level has differences and equalities. In this study, it was important to identify the differences between each level, then, for the cases in which the rejection of the null hypothesis occurred, according to Kruskal-Wallis test, multiple comparisons tests were performed (Campbell &Skillings, 1985). The software used to analyze the results was the IBM SPSS - 20.

5 PRESENTATION AND RESULTS ANALYSIS

Based on the non-parametric tests assumptions, the results will be presented in accordance with the distribution differences, segmented through socio-demographic information respectively by gender, income and age bracket. In addition, the first five variables of analysis are related to the consumer behavior as to his attention to advertisements for both, advertisements of the stores and advertisements of the brands; as to his perception that there is time saving as an advantage of the household appliances; and in relation to fidelity, also with regard to both, the stores and the brands. The other four variables are related to the innovation attributes concerning the intensity and the adoption. The initials letters in Table 1 correspond to the scale concordance levels shown in the Figure 1.

Table 1: Distribution of the concordance rate

	CA (%)	PA (%)	NAND (%)	PD (%)	CD (%)
Advertisement of Stores	48,7	13,1	14,4	7,2	16,7
Advertisement of Brands	34,4	11,8	14,1	13,6	26,2
Time Saving	72,6	14,9	6,2	1,8	4,6
Fidelity to Store	15,1	7,2	15,4	12,3	50,0
Fidelity to Brand	23,6	7,7	16,9	10,3	41,5
Incremental Innovation	45,4	13,3	7,9	10,5	22,8
Radical Innovation	16,9	7,7	18,2	16,9	40,3
Early Adopters	8,7	8,7	15,4	14,6	52,6
Tardy Adopters	30,0	12,1	25,1	12,3	20,5

N = 390
CA: Completely Agree; PA: Partially Agree; NAND: Neither Agree Nor Disagree; PD: Partially Disagree; CD: Completely Disagree.
Source: Research Data

Initially, it is noticed that the greatest degree of concordance among the respondents was due to the understanding about the time saving that the home appliance provides when performing the task (87.5% agreed partially or completely with this characteristic). Moreover, consumers have shown to be more attentive to the advertisements of the household appliance stores (61.8% of CA and PA) than the brands advertising (46.2% of CA and PA), since the retail plays a fundamental role in this market, being a facilitator intermediary between manufacturers and low-income consumers (Parente & Barki, 2008).

With regard to fidelity, the roles are reversed: although the difference is smaller, there is greater fidelity to the product brand than to retail stores (31.3% vs. 22.3%, combined CA and PA). This implies stating that low-income consumers keep always buying products of the same brands, but they seek to be informed about the products, through the retail stores' advertisements. As home appliance competition in retail is high, and considering the number of businesses, stores and access channels to the consumer, the loyalty is lower. In relation to product brands, fidelity is higher.

Furthermore, in relation to innovation attributes, the empirical results will fully meet the theoretical foundation. When low-income consumers buy home appliances products, they opt for products with incremental innovations (58.7 % CA and PA), instead of products with radical innovation (24.6% CA and PA), as pointed out in the literature (Prahalad, 2012;

Viswanathan & Sridharan, 2012; Nogamiet al, 2013). This happens in view of the products price and the accessibility (Prahalad, 2005; Varadarajan, 2009). Regarding adoption, empirical evidence also corroborates the theory, since, among the respondents, 42.1% (CA and PA) adopt the "innovative products" tardily, against 17.4% (CA and PA), who promptly adopt the products. In all the cases presented here it is possible to come to the same conclusions when the information is analyzed through the points of view of the statements of complete disagreement and partial disagreement.

5.1 GENDER

To perform the non-parametric test with two groups, the recommended analysis is the Mann Whitney analysis, since the groups, in this case, are composed of men (32.8 %) and women (67.2 %). Observing the results in Table 2, it is possible to notice that, in general, concerning to household appliances, there are significant differences between men and women, but they are based on the consumer behavior of each genre. On the other hand, there are no significant differences regarding to innovation attributes.

Table 2: Distribution of the concordance rate by gender

		CA (%)	PA(%)	NAND(%	PD (%)	CD (%)	Sig.
Advertisement of stores	Women	53,1	12,2	13,7	5,3	15,6	0,019**
	Men	39,8	14,8	15,6	10,9	18,8	
Advertisement of Brands	Women	39,7	11,1	11,8	12,6	24,8	0,014**
	Men	23,4	13,3	18,8	15,6	28,9	
Time Saving	Women	79,0	13,7	5,7	1,1	0,4	0,000***
	Men	59,4	17,2	7,0	3,1	13,3	
Fidelity to Store	Women	15,3	5,7	15,6	14,5	48,9	0,934
	Men	14,8	10,2	14,8	7,8	52,3	
Fidelity to Brand	Women	25,6	7,3	17,9	11,5	37,8	0,062*
	Men	19,5	8,6	14,8	7,8	49,2	
Incremental Innovation	Women	47.7	14.5	7.3	9.2	21.4	0,107
	Men	40,6	10,9	9,4	13,3	25,8	
Radical Innovation	Women	16,4	7,6	21,0	18,7	36,3	0,155
	Men	18,0	7,8	12,5	13,3	48,4	
Early Adopters	Women	6,9	8,8	15,3	16,0	53,1	0,380
	Men	12,5	8,6	15,6	11,7	51,6	
Tardy Adopters	Women	30,5	13,7	24,4	12,6	18,7	0,265
	Men	28,9	8,6	26,6	11,7	24,2	

*** p < 0,01; ** p < 0,05; * p < 0,1
Non-Parametric Test: Mann-Whitney
Source: Research Data

As previously commented, the cultural issue appears to be quite important, where the women play the role of organizing the home, especially in the low-income market (Azevedo&Mardegan Jr. 2009). As expected, women are those people who most dedicate attention to the advertisements, both, to the stores advertisements and to the brands advertisements, and they are loyal to the brands. In the category saving-time attribute, it was possible to find more significant p value ($p < 0.000$), since the women are the ones who most use the products mentioned.

Observing the answers distribution, relative to intensity and to innovation adoption, it is noticed that, despite there is no statistical difference between men and women, in the collected sample the women were the tardy adopters, admitting difficulties in understanding the new technologies (44.2% totaling CA and PA, against 37.5% of men). In addition, the incremental innovation is more common among women (62.2% adding CA plus PA, against 51.5% of men).

These data indicate that women are more cautious and less willing to take risks, as pointed out by Azevedo and Mardegan Jr. (2009). The low-income consumers cannot run risks and do not give themselves the luxury of making a wrong purchase, since the income is limited. Regarding the purchase of appliances, women are those who, usually make decisions for the whole family, concerning home appliances, present tardy adoptions, and opt by incremental innovations on the chosen products (Azevedo & Mardegan Jr. 2009).

5.2 INCOME

For the analysis among ‘income groups”, the non-parametric Mann-Whitney test was chosen again, since the groups analyzed were the consumers of C1 class (54.6 %) and consumers of C2 and D classes together, (45.4 %) to balance the sample size. Observing the results in Table 3, in general, it is possible to notice that there is little difference of opinion among income groups. This socio-demographic characteristic was the one which presented the smallest number of significant rates ($p < 0.01$). This is understandable, considering that this public has homogeneous characteristics, in some ways. As the increase in consumption by this

segment is a recent occurrence, the buying behavior heterogeneities are not yet outlined.

Table 3: Distribution of the concordance rate by income

		CA	PA	NAND	PD	CD	Sig.
Advertisement of Stores	C1	46,5%	10,8%	13,1%	9,4%	20,2%	0,060*
	C2/D	51,4%	15,8%	15,8%	4,5%	12,4%	
Advertisement of Brands	C1	31,0%	11,3%	15,0%	13,6%	29,1%	0,077*
	C2/D	38,4%	12,4%	13,0%	13,6%	22,6%	
Time Saving	C1	75,6%	12,7%	6,6%	0,9%	4,2%	0,160
	C2/D	68,9%	17,5%	5,6%	2,8%	5,1%	
Fidelity to Store	C1	12,7%	7,5%	17,8%	12,2%	49,8%	0,752
	C2/D	18,1%	6,8%	12,4%	12,4%	50,3%	
		CA	**PA**	**NAND**	**PD**	**CD**	**Sig.**
Fidelity to Brand	C1	24,9%	8,5%	17,4%	11,7%	37,6%	0,151
	C2/D	22,0%	6,8%	16,4%	8,5%	46,3%	
Incremental Innovation	C1	41,8%	12,7%	7,5%	12,7%	25,4%	0,060*
	C2/D	49,7%	14,1%	8,5%	7,9%	19,8%	
Radical Innovation	C1	15,5%	9,4%	22,5%	14,6%	38,0%	0,308
	C2/D	18,6%	5,6%	13,0%	19,8%	42,9%	
Early Adopters	C1	10,8%	10,3%	16,4%	11,7%	50,7%	0,110
	C2/D	6,2%	6,8%	14,1%	18,1%	54,8%	
Tardy Adopters	C1	27,2%	13,6%	23,9%	12,7%	22,5%	0,221
	C2/D	33,3%	10,2%	26,6%	11,9%	18,1%	

*** p < 0,01; ** p < 0,05; * p < 0,1
Non Parametric Test: Mann-Whitney
Source: Research Data

Concerning the attention to advertisement of shops and brands, there were slight differences between the groups. Lower income consumers (C2 and D) proved to be more attentive, since they need concrete information before making their purchasing decisions. C1 Class consumers have already got greater security for shopping, looking for more determinants ways to their decision making.

Regarding the innovation intensity, it is noticed that lower income consumers (C2 and D) have greater predisposition to buy more incremental products due to high prices, the difficulty of handling and, above all , the fear of buying something useless having to throw it away and to buy another (Azevedo & Mardegan JR.,2009). Moreover, although not significant (narrowly), C1 Class consumers are more likely to be early adopters than the C2 and D classes.

5.3 AGE BRACKET GROUP

To perform the non-parametric test with more than two groups , the most relevant analysis is the Kruskal-Wallis test , since in this case the groups are comprised of young (26.4 %), adults (41.8 %) and mature (31,8%) . The classification criterion of the people was: under 30 years old = young; between 31 and 50 years old = adults; and above 50 years old = mature. Observing the results in Table 4, it is noticed that in a general way, with regard to home appliances consumption and their respective characteristics regarding innovation, the age group was the criterion that most presented rates of statistical significance (p <0 , 1) for the differences between the groups, once it presented three groups.

Table 4: Distribution of the concordance rate by age group

		CA	PA	NAND	PD	CD	Sig.
Advertisement of Stores	Young [a]	38,80%	13,60%	17,50%	9,70%	20,40%	
	Adults [a]	46,60%	11,70%	15,30%	7,40%	19,00%	0,002**
	Mature b	59,70%	14,50%	10,50%	4,80%	10,50%	
Advertisement Of Brands	Young [a]	26,20%	11,70%	11,70%	22,30%	28,20%	0,000***
	Adults [a]	29,40%	9,20%	17,20%	12,90%	31,30%	
Time Saving	Young b	58,30%	21,40%	11,70%	0,00%	8,70%	
	Adults [a]	78,50%	12,30%	4,95%	1,80%	2,50%	0,001***
	Mature[a]	76,60%	12,90%	3,20%	3,20%	4,00%	
Fidelity	Young [a]	14,60%	4,90%	15,50%	17,50%	47,60%	
	Adults [a]	10,40%	5,50%	16,60%	13,50%	54,00%	0,069*
	Mature b	21,80%	11,30%	13,70%	6,50%	46,80%	
Fidelity	Young	19,40%	7,80%	18,40%	16,50%	37,90%	
	Adults	25,20%	6,70%	14,70%	10,40%	42,90%	0,923
	Mature	25,00%	8,90%	18,50%	4,80%	42,70%	
Incremental Innovation	Young	38,80%	12,60%	13,60%	11,70%	23,30%	
	Adults	42,90%	17,80%	4,90%	11,70%	22,70%	0,229
	Mature	54,00%	8,10%	7,30%	8,10%	22,60%	
Radical	Young	20,40%	9,70%	17,50%	20,40%	32,00%	0,149
	Adults	14,70%	5,50%	22,10%	18,40%	39,30%	
	Mature	16,90%	8,90%	13,70%	12,10%	48,40%	
Early Adopters	Young [a]	7,80%	12,60%	18,40%	20,40%	40,80%	
	Adults [a]	8,00%	8,60%	9,80%	17,20%	56,40%	0,067*
	Mature b	10,50%	5,60%	20,20%	6,50%	57,30%	
Tardy Adopters	Young b	14,60%	9,70%	28,20%	20,40%	27,20%	0,000***
	Adults [a]	29,40%	16,00%	26,40%	9,80%	18,40%	
	Mature [a]	43,50%	8,90%	21,00%	8,90%	17,70%	

*** p < 0,01; ** p < 0,05; * p < 0,1
Non-Parametric Test: Kruskal-Wallis
[a]etermines the similarity groups;
[b] determines the different groups.
Source: Research Data

When evaluating the attention to advertisement of both, stores and brands, youth and adults have the same degree of agreement in relation to the greater value of the mature people. This indicates that the mature consumer can be considered less secure and require additional information for decision making, especially when innovation-related issues are involved. In relation to the time-saving, the group that is different is the group of young people. Considering that the young people live in a constant stirring and have a quite dynamic day-by-day style, mixing professional life, student life, married life and social life, this group considers the time-saving attribute as the most important. Concerning store loyalty, none of the three groups showed a high level of agreement, however, the mature group demonstrated to be more faithful, since they continue purchasing products always in the same store, which can provide a sense of nostalgia and credibility in relation to traditionalism, most common among people in this age bracket.

Moving on to the analysis of innovation, specifically regarding the adoption (" p" significant values), it is possible to conclude that consumers at a younger age are more likely to take risks, and they are early adopters and not tardy adopters (Nakata & Weidner, 2012). More experienced consumers are more cautious when it comes to innovation and they tend to adopt these products tardily (Anderson &Billou, 2007).

6 FINAL CONSIDERATIONS

In the present study, it was sought to contribute theoretically to the conceptual interaction between the theme innovation and the consumption at the base of the pyramid (low-income). The term innovation is directly linked to advancement, technology and modernity. However, these elements are not directly found in the concept of innovation for low-income consumers (Viswanathan & Sridharan, 2012). This way, it was possible to study concepts of innovation and score them in the low-income market, theoretically contributing to the academic advancement.

A second contribution of this study is related to the method used to analyze the data. In view of the data collection difficulties, due to the size of the questionnaires, the complexity of the questions and the target audience researched, an alternative to enable the data collection was the use of a

response card with ordinal scales, instead of the traditional intervallic scales. Thus, non-parametric statistic has become more suitable for the data analysis.

Overall, it was possible to find confirmation of empirical evidence regarding the theoretical basis used. The low-income consumers effectively are more likely to acquire incremental innovations with adjustments to the product, instead of radical innovations (Varadarajan, 2009; Antioco & Kleijnen, 2010). Moreover, the innovation adoption tends to be tardy and not early, bearing in mind the precautions that these consumers must take with regard to the risks of poorly executed purchases (Anderson &Billou, 2007).

Moreover, through the analysis of non-parametric tests it was possible to observe that women, due to their greater buying decision power in the low-income families, tend to pay more attention to marketing stimulus and to better understand the benefit of time-saving of home appliances products (Azevedo & Mardegan Jr., 2009). Regarding the innovation, women also tend to be more traditional. As for income, little difference was found among the groups. In relation to the age bracket, it was crystal clear that younger people tend to adopt the products initially with radical innovations and the older people tend to buy products with less innovation and tardily.

6.1 LIMITATIONS AND SUGGESTIONS

In the income analysis, the socio-economic classes' tracks could be expanded, since all of them in this study were low-income classes; thus, it was not possible to find so many significant results as in other groups, or comparisons among classes. In addition, other variables could be analyzed for testing the distribution differences, educational level and region of residence. To choose other products can also be an alternative to empirically verify the same phenomenon, innovation intensity and adoption in the low-income market, starting from other points of view.

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