Value perception in the consumption of convergent technology products with green attributes

A percepção de valor no consumo de produtos tecnológicos convergentes com atributos verdes

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Abstract: Due to the growing concerns about environmental issues, quality of life and well-being, consumers are considering the importance of obtaining eco-friendly products or devices with green functionality features. This scenario led to the investigation of the influence of green features on the intention to purchase of convergent products, with hedonic and utilitarian bases. We developed a quantitative experimental research, with application of online questionnaires at a University in the State of Pará, aiming to study the smartphones and their different usability. The results indicate increased intention of purchase of devices with "green" features on both a hedonic and a utilitarian basis. However, the addition of "green" features was more significant in the hedonic base, suggesting a utilitarian justification, reducing the guilty feeling inherent to the acquisition of hedonic products.

Keywords: Consumer behavior; Hedonism; Utilitarianism; Technology convergence; Green integration.

Resumo: *Devido à crescente preocupação com as questões ambientais, qualidade de vida e bem-estar, consumidores passaram a considerar a importância da aquisição de produtos ecologicamente corretos ou com características verdes integradas nas funções dos equipamentos. Esse cenário sugeriu a investigação da influência dos atributos verdes na intenção de compra de produtos convergentes com bases hedônicas e utilitárias. Foi desenvolvida uma pesquisa quantitativa experimental, com aplicação de questionários on-line em uma universidade do Estado do Pará tendo como objeto de estudo os smartphones e suas diferentes usabilidades. Os resultados indicam que quando se integra atributos "verdes", tanto em base hedônica como utilitária, aumenta-se a intenção de compra. Entretanto, a adição do atributo "verde" apresentou-se mais significativa na base hedônica, o que sugere ser a justificação utilitária, reduzindo o sentimento de culpa inerente à aquisição de produtos hedônicos.*

Palavras-chave: *Comportamento do consumidor; Hedonismo; Utilitarismo; Convergência tecnológica; Integração "verde".*

1 Introduction

The current scenario of constant technological innovation has led to the rapid development of products and services, attracting increasing numbers of consumers of all ages, classes, and cultures (Gerpott et al., 2013). Nowadays, it is not surprising that devices such as cell phones, digital cameras, and MP3 players are considered "essential consumption elements" for a large part of the population (Han et al., 2009).

One of the great driving forces responsible for the increase in the high-tech market has not been the availability of different services across systems or devices, but rather the integration of all these services in a single platform (Kim et al., 2005; Arruda &

Costa, 2015). As consumers' interest in products that include more than one function grows, these clients are increasingly attracted by multifunctional devices; in other words, integrated products are more popular compared to individual (dedicated) products (Harris & Blair, 2006; Lee et al., 2013).

Highly technological devices have developed beyond the basic utilitarian function for which they were originally conceived, as the market has consistently provided these products with fewer utilitarian and more hedonic factors, leading users to choose devices as tools for fun and pleasure, rather than pure function (Arruda, 2008; Sela & Berger, 2012).

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According to Katz & Sugiyama (2006), people use mobile technologies as tools in their daily lives, making these technologies part of their image, akin to a clothing accessory. This raises interesting questions regarding the value created by consumers, given the hedonic and utilitarian benefits of these devices, as well as the conditions in which these values are developed.

Convergence has allowed for the combination of various functionalities within existing products, enabling actions that differentiate these products from the original, dedicated version (e.g., watching TV on a cell phone or accessing the Internet through a personal digital assistant) (Gill, 2008). Products formed via the addition of new functionalities (from another category) to the existing base are referred to as "convergent products" (Gill, 2008; Lee et al., 2013), because they have the capacity to perform several functions in a single device. This develops the multifunctionality that attracts diverse consumers of this new product concept.

According to Gill (2008), an important management issue for convergent products is determining which types of new functionality should be added to specific base products (main features or functionalities of the product, such as cell phones that have telephone functionality as the base feature, but are integrated with Internet connectivity, music and video playback capabilities, etc.). For example, take a GPS manufacturer who is considering adding mobile TV functionality to their equipment; this would mean integrating new and different functionality with the preexisting navigation functions. Conversely, it might be better to add new functionality that is similar to the existing features of the GPS, such as satellite radio.

With reference to these different combination options, Gill (2008) conducted a study to assess which types of additions are most successful. Gill's research is significant because it shows that, due to convergence, electronics, computers, and communications device manufacturers (e.g., manufacturers of cell phones, televisions, PCs, games, MP3 players, etc.) can easily upgrade their existing products by adding new functionalities from different categories. Indeed, the integration of diverse functionalities is widely considered positive within these markets, as they allow manufacturers to innovate and launch new products that are closer to consumers' needs/desires about technology (Sela & Berger, 2012; Lee et al., 2013).

Such innovations include a variety of new ideas on how to improve the eco-efficiency of consumption through new technologies and services, and the shared use of products (Heiskanen et al., 2005). Many of these ideas have evolved from the suggestions of technological innovation and environmental experts.

However, this poses questions regarding how these innovations will be adopted by consumers, and how manufacturers of technological devices should integrate various functionalities to meet the new, "greener," consumption trend. For which types of devices is the inclusion of "green" attributes in convergent products most successful?

As such, the central research question of this study can be summarized as follows: How does introducing green attributes into hedonic- and utilitarian-based convergent devices affect the purchase intention of consumers of high-technology devices?

Therefore, based on the analysis of consumer behavior, it is accepted as main objective to analyze if there are variations of the purchase intention of the technological consumer in convergent products when adding green attributes in different bases.

In this sense, it is understood that investigations that address the determinants of product adoption behavior, based on convergent technology associated with "green" insertion, particularly in the variation of the intention to buy in devices with different bases, are especially opportune (Arruda & Brito, 2017). The present study is therefore based on these elements: technological convergence, hedonic, utilitarian and social values and "green" consumption.

2 Literature review

2.1 Convergence in the high-tech market

Harris & Blair (2006) argued that the integration of several functionalities into a single device is a plausible response to the perceived need for risk reduction in high-tech products. Such risk reduction happens because integration within products reduces uncertainty regarding their use, and may thus even increase the number of buyers of such equipment (Sela & Berger, 2012).

Convergence allows for an increase in the number of functionalities that can be performed by the technological product (Gill, 2008; Lee et al., 2013). For Kim et al. (2005), convergent devices have become a worldwide preference.

This preference can be explained based on the increasing need for people to carry such equipment everywhere, at all times of day (Kim et al., 2005). It is also possible that convergent products are directly linked to the continuous path of physical reduction; indeed, the technology market has increasingly presented integrations on smaller platforms when compared to predecessor products.

In this scenario of multifunctionality, there is a need to understand which characteristics add value when properly integrated. Companies must increasingly seek to identify the attributes that add motivation

to purchase within a convergent context (Santos, 2003). Multiple characteristics should not only add up in a numerical way, but also have meaning for consumers within the context in which the product is displayed (Sela & Berger, 2012).

2.2 Convergence in hedonic - and utilitarian - based products

Due to the expansion of the convergent technologies market and the consequent diversity of new products, Gill (2008) developed a study to analyze how different additions impact the image of a product (incremental value), based on the hedonic and utilitarian nature of its functionalities. Gill proposed a model to describe the "addition of new functionalities to different existing base products", which resulted in the following findings:

a) The addition of utilitarian functionalities to a utilitarian base will increase the value of congruence, but not to the extent expected, given the low interest in acquiring products with many diverse but similar functions;

b) The addition of hedonic functionalities to a utilitarian base will considerably increase the value of the product, since hedonic functionalities are perceived as more enjoyable/fun (and are associated with positive affect) when compared to utilitarian functionalities, such that adding them results in a hedonic value gain for a utilitarian-based product;

c) The addition of utilitarian functionalities to a hedonic base will reduce the value of the device, given the consumer preference for hedonic products, which leads those who chose a hedonic base to desire greater integration of the same type of functionality;

d) The addition of hedonic functionalities to a hedonic base will lead to a sharp increase in the value of the device, given the predisposition to acquire products that provide fun via their use, as it increases the perception of fun and pleasure to be derived from the device.

In the scenario proposed in the Gill's study, an initial hedonic base benefits from an increase in the value of congruence when hedonic functionalities are added, while the reverse effect is noted when utilitarian functionalities are added, thereby negatively affecting the incremental value.

On the other hand, an initial utilitarian-based device increases in value when utilitarian functionalities are added, but there is a greater incremental increase when hedonic functionalities are added, given the hedonic preference in consumption that transforms the utilitarian proposition into something more fun.

The composition of attributes in convergent devices gives rise to judgments within the functional and emotional context of consumption (Ozcan & Sheinin, 2015), leading users of technological products to focus their intentions on characteristics that may be constructed in an emotional but reasonably justified manner (Okada, 2005; Arruda, 2008).

2.3 Sustainable consumption

Sustainable consumption, as defined by Barbieri & Silva (2011), comprises the full range of products and services, as well the processes that produce them and the consumption and manufacture of collateral and interconnected products. Thus, sustainable consumption is subject to different consumption patterns for each income level within the economies of various countries. For the purposes of the current study, it is necessary to disregard the issue of resource use patterns and focus more on its levels of sustainable consumption, given the management priorities within this sustainable scenario (Sellitto & Hermann, 2016).

Sustainable consumption is likely to be broader compared to other types of consumption (conscious, ethical, green), because, in addition to technological innovations and changes in individual choices of consumption, it emphasizes collective actions and political, economic, and institutional changes to make patterns and levels of consumption more sustainable (Viegas & Teodósio, 2011; Echegaray, 2016). More than an action strategy to be implemented by consumers, sustainable consumption is a goal to be achieved (Olson, 2013). More specifically, if someone can say "I am green consumer," or "I am a conscious consumer," there would be no point in saying "I am a sustainable consumer" (Viegas & Teodósio, 2011; Echegaray, 2016).

The concept of sustainable consumption stems from the expression "sustainable development", which was raised within the context of Agenda 21, Rio-92 (Sitarz, 1993). This agenda contained an entire chapter on "changing consumption patterns", laying the groundwork for the development of more sustainable consumption patterns and suggesting the objective of developing production and consumption patterns that minimize environmental impacts and meet the basic needs of society, as well as providing a better understanding of the role of consumption and sustainable consumption patterns (Viegas & Teodósio, 2011; Schuitema & De Groot, 2015; Echegaray, 2016).

2.4 Environmentally friendly or "green" products

According to Ottman & Paro (1994), an environmentally friendly or green product must be designed to meet the environmental preservation needs of consumers committed to this cause; however, it is necessary to consider this a secondary objective. Consumers, in general, do not buy a product because it is green, but rather because it is "also green." Since consumers buy products for other purposes, the characteristics of environmental concern represent additional increments that may exceed consumer expectations (Arruda & Brito, 2017; Arruda et al., 2017).

The perception of green attributes as a point of appeal or an addition to the convergent product scenario brings huge diversity to the decision process, because the consumer values differently that which is perceived as green from that which has an extra characteristic in addition to being green (Gershoff & Frels, 2015). There is clear environmental awareness in present-day society; however, such awareness contextualizes feelings of guilt and failure with the responsibilities of a group that did not do the right thing for an ideal society (Lin & Chang, 2012).

There is still no unified definition in the literature regarding what constitutes an environmentally friendly or green product, because metrics have not yet been created that enable satisfactory measurement of the environmental impacts of one product compared to another. However, the term "green" applies to products that have less impact on the environment when compared to their alternatives (Ottman & Paro, 1994). Taking this into consideration, both synonyms (green and sustainability) will be considered in this research.

Given this scenario, the effects of attributes in a multifunctional environment with several characteristics, some of which may be green, are better accepted and understood as additional when compared to a purely green product with characteristics oriented toward a single concept (Olson, 2013). Therefore, the purchase intention regarding multifunctional products, which are justifiable within the conscious context of consumption, is greater when the propositions are embedded in the rational concept of technology alongside emotional descriptions for the use of this device. This is due to the fun application and possession status, which returns the product to being a rational purchase thanks to the environmental awareness involved (Schuitema & De Groot, 2015). In other words, the consumer has the possibility of purchasing something modern (technology), responsible (green), rational (product with useful characteristics), and emotional (something differentiating and prestigious—i.e., featuring green technology).

2.5 Utilitarian- versus hedonic-based products: consumer preferences for products with green attributes

In the utilitarian literature (Fishbein & Ajzen, 1975; Hirschman & Holbrook, 1982; Slama & Singley, 1996), utilitarian consumption has been analyzed with reference to the benefits acquired through rational choice, whereby the physical attributes of the product generate satisfaction by facilitating the performance of tasks related to study and work. Social and/or environmental responsibility is seen as a utility to society, because consumers seek out products that are not useful just to them, but rather to society as a whole (Heiskanen et al., 2005).

Therefore, utility related to sustainable consumption is characterized whenever the consumer searches, including during the purchasing decision process, for products with ecological characteristics (Ottman & Paro, 1994). Thus, in this study the addition of green attributes is considered a utilitarian addition.

Based on a study by Okada (2005), hedonic and utilitarian values are not opposites, since both characteristics offer benefits to the consumer—the former through a pleasure experience and the latter in terms of functionality. However, when products are presented individually, they constitutes alternatives to one another, since there is a strong preference for hedonic devices, and when presented together the preference lies with utilitarian products, given the feelings of guilt related to choosing a hedonic product intended for fun and pleasure.

Drawing on the model proposed by Gill (2008), which proposes that when a new utilitarian functionality is added to utilitarian-based products—i.e., utilitarian convergence (integration)—it will have little incremental value, the following hypothesis is proposed:

> H_1: When a green attribute is added to a utilitarian-based product, the purchase intention increases moderately when compared to other integration possibilities, because the addition of a green attribute is seen as a utilitarian integration, with little incremental value.

According to Okada (2005), there is a certain preference for acquiring pleasure- and fun-related—i.e., hedonic—products, although these kinds of products are associated with a feeling of guilt, since their benefits compared to utilitarian products, are more difficult to measure and there is a need to justify their purchase. Okada also reported that the purchase of utilitarian products is easier to justify. In accordance with the model proposed by Gill (2008), which suggests that for hedonic-based convergent products the addition

of utilitarian functionality will negatively impact the hedonic base and could dilute its hedonic image, thus reducing the value of the addition, the following hypotheses are presented:

H_{2a}: When a green attribute is added to a hedonic-based convergent product, the purchase intention increases because the green integration is perceived as mitigating the guilt generated by hedonic consumption;

H_{2b}: When a green attribute is added to a hedonic-based convergent product, the purchase intention decreases because the perception of green integration is seen as a utilitarian addition to the "fun" base, thus reducing its value.

The two hypotheses above were created for the same scenario; H_{2a} comprises the theoretical-based explanation in case of an increase in the purchase intention, whereas H_{2b} serves as the explanation in case of a decrease in the purchase intention. Thus, the acceptance of one of these hypotheses will lead to rejection of the other.

3 Methods

This research is classified as an applied study according to its purpose, as "[…] it aims to generate knowledge for practical applications aimed at solving specific problems" (Saunders, 2011, p. 2-20).

Regarding its objectives, the study is explanatory, falling into Saunders' (2011, p. 2-20) categorization as research that seeks to identify the factors that determine or contribute to the occurrence of certain phenomena. With respect to methods, the research can be classified as field or experimental research. Field research is based on empirical study of the object under discussion, while an experimental study or experiment is one that determines a subject to be studied, the variables that could affect it, and the means of control and observation of the implications produced in the subject by the variable (Montgomery, 2012, p. 1-23). Therefore, experimental methods allow the researcher to change variables of interest, by creating scenarios, in order to observe the changes that arise from the imposed modifications (Cooper & Schindler, 2011). Finally, a quantitative approach is used. Such an approach is based on surveys, and aims to uncover certain characteristics of the subject under study. In organizational studies, such research allows for the measurement of opinions, reactions, habits, and attitudes in a given universe, through statistically representative samples (Saunders, 2011, p. 2-20).

The target population in this research is composed of young university students who are potential consumers of smartphones. The student population was drawn from the Federal University of Pará, and comprised both men and women, aged between 18-35. A young, student population was chosen given the significant percentage they account for in the consumption of smartphones. According to a study by Pontomobi (2011), a Latin American mobile marketing group, of the total number of smartphone users, 61.10% fall within the 18-30 age group and 56.4% are students.

In order to select the sample, the population as listed on the university's online portal, was considered. Thus, 25,874 total enrolled students were considered, which included new students and graduates distributed across several undergraduate courses. The data collected were obtained though a sample based on a degree of confidence (Z), with a margin of error equal to 6.61%.

A total of 256 questionnaires were distributed, of which 112 were conducted in the laboratory and answered via computer and 144 were conducted in the classroom in pencil-and-paper form. Of this total, 218 were usable; four electronic questionnaires were incomplete and 34 of those completed in the classroom contained unanswered questions. This did not compromise the results of the research, since the total number of valid questionnaires is within the stipulated sampling error.

3.1 Research design

3.1.1 Proposed scenario and stimuli

A 2×2 (base × convergence/integration) study was developed, generating four research outputs and, consequently, four questionnaires, with all questions identical for all scenarios, except for the stimulus. With this differentiated model it is possible to observe behavior change when the scenario presents a new structure. In this case, this was represented by the same smartphone with different functionalities for each scenario created (see Figure 1).

The first, utilitarian-based, scenario without green integration had the following functionalities: Office Mobile package (Excel, Word, & PowerPoint), flashlight, appointment calendar, and maps with public transport routes. Integrations present in this scenario are considered utilitarian because they are features that help people perform tasks, such as those related to study or work.

The second, utilitarian-based, scenario without green integration had the same functionalities as the first scenario, in addition to the following green
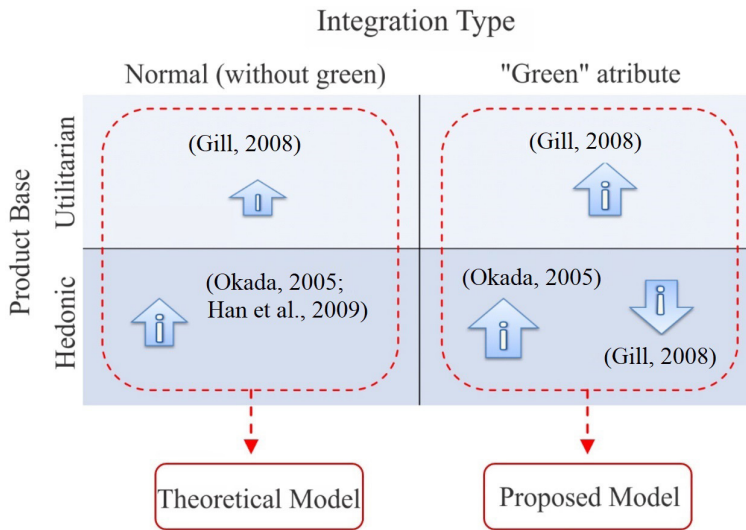
Figure 1. Purchase Intention Matrix and Product Integration in the Base Scenario (i = purchase intention). Source: Gill (2008), Okada (2005) and Han et al. (2009).

attributes/characteristics: solar charger, ecological applications produced with recycled materials.

The third, hedonic-based, scenario without green integration provided the following functionalities: MP3 player, eight-megapixel camera, social networking apps, and 3D gaming functionality. Integrations in this scenario are considered hedonic because they intend to provide the user with entertainment, and feelings of fun and pleasure.

The fourth and final, hedonic-based, scenario with green integration included the following green attributes/characteristics in addition to the functionalities present in the third scenario: solar charger, ecological applications produced with recycled materials.

Each respondent received a questionnaire without knowledge of other existing models, so as not to develop any direct comparison other than that based on their previous knowledge. Clear figures and explanatory text showing the product and its features were presented in each questionnaire. No response or personal stimulus was provided to any element of the sample.

An assessment of the quality of the product was carried out to ensure it was perceived positively, as a negative view could have resulted in nonacceptance of the product and a consequent low purchase intention. The participants were not informed of the product's brand so as not to influence their decision, because the selected behavior concerns use of existing integrations in the device.

The research design is a relationship matrix between base (hedonic and utilitarian) and integration (with or without green attributes), creating relevant scenarios capable of stimulating the justification of each consumer when exposed to a specific environment (as shown in Figure 1). These stimuli were assessed by checking the manipulation (t-test).

Several extant studies have proven the influence of hedonic and utilitarian value on the purchase intention, as well as its variations (which could limit the use of questionnaires only to scenarios of the proposed model). However, the questionnaire was applied to all scenarios in order to validate and support the theoretical model, as well as to compare the variation in intention in the different models. This enabled testing of the hypotheses created in this study.

Descriptive analyses were carried out on the profile of the sample participants. Subsequently, the theoretical model was validated in order to prove that the hedonic and utilitarian variables were reliable for analyzing the purchase intention. Thus, the following statistical techniques were used: Pearson's correlation, Cronbach's alpha, and linear regression (and respective tests). Then, in order to validate or reject the hypotheses created for the proposed model, an analysis of variance (ANOVA) was conducted; this enabled assessment of the mean values for each proposed scenario, guaranteeing the research analysis.

4 Results

Regarding gender, Table 1 shows that there was a balanced distribution between males and females in the study.

As shown in Table 2, the respondents' age group was concentrated on young people, with approximately 87% of participants aged 27 or younger, while less than 13% of the sample was 28 or older. This is due to the way in which the sample was formed, since a

large portion of university students is composed of young people and adolescents.

The correlation analysis made it possible to measure which variables were correlated, where the variables should have a correlation coefficient within the proposed levels of significance (i.e., less than 0.05 or 0.01). It is also worth noting that this coefficient, being positive, represents a correlation in the same direction—i.e., when the value attributed to a variable (independent) increases, the value of the other variable (dependent) will consequently increase. However, if it is negative, the direction

will be opposite, so that by increasing the value assigned to a variable, the value of the other variable will decrease.

Table 3 shows that purchase intention is significant for all other independent variables analyzed, and also shows a correlation between all other independent variables, representing a relation, and an explanation of the study design.

The purchase intention construct was composed of two variables that corresponded to the statements "I'd like to have" and "I am interested in having," yielding an alpha of 0.855. The hedonic construct was composed of three variables referring to questions about happiness, fun, and pleasure, yielding an alpha of 0.864. Any modification of one of these factors would reduce the proposed confidence level.

Similarly, the utilitarian construct was measured using three variables—utility, importance for work and/or study, and necessity—yielding an alpha of 0.908. As all alpha tests presented coefficients higher than 0.7, this value was maintained and considered satisfactory for the constructs purchase intention, hedonic value, and utilitarian value, as shown in Table 4.

Next, in order to validate the research design, a multiple regression was carried out (Table 5) to identify whether the independent variables actually explained the proposed study environment (Montgomery, 2012, p. 449-475). The purpose was to analyze the correlation between utilitarian value and hedonic value (independent variables) and purchase intention (dependent variable).

Table 1. Demographics: gender.

Gender	Frequency	%
Male	108	49.54
Female	110	50.56
TOTAL	218	100.0

Source: Author (2013).

Table 2. Demographics: age.

Age	Frequency	%
Up to 21 years	108	49.54
22-27 years	82	37.61
28-35 years	27	12.39
36-45 years	1	0.46
TOTAL	218	100.0

Source: Author (2013).

Table 3. Correlation analysis among variables.

	Purchase	Interest	Fun	Pleasure	Happiness	Usefulness	Importance	Necessity
Purchase	1							
Interest	.747**	1						
Fun	.555**	.553**	1					
Pleasure	.548**	.567**	.703**	1				
Happiness	.595**	.589**	.625**	.710**	1			
Usefulness	.537**	.587**	.394**	.465**	.528**	1		
Importance	.404**	.477**	.288**	.378**	.530**	.750**	1	
Necessity	.378**	.461**	.268**	.373**	.464**	.734**	.821**	1

** Correlation is significant at the 0.01 level (1-tailed). Source: Author (2013).

Table 4. Reliability analysis of constructs by Cronbach's Alpha.

Variables	Mean	Alpha	Construct
Purchase	5.94	0.855	Purchase Intention
Interest	5.87		
Necessity	5.28	0.908	Utilitarian Value
Useful	5.68		
Importance	5.32		
Fun	5.48	0.864	Hedonic Value
Pleasure	5.36		
Happiness	5.12		

Source: Author (2013).

Table 5. Regression analysis.

Variable	Variables	Nonstandardized Coefficients		Standardized Coefficients	t	Sig.
Dependent	Independent	B	Std. Error	Beta		
	(Constant)	1.511	0.295		5.127	0.000
Purchase Intention	Hedonic Value	0.559	0.055	0.548	10.115	0.000
	Utilitarian Value	0.262	0.052	0.274	5.046	0.000

Source: Author (2013).

It can be observed from Table 5 that the independent variables analyzed exerted an influence on the dependent variable, with substantial significance. Therefore, it can be concluded that the greater the identification of hedonic and utilitarian features within a device, the greater the purchase intention for the researched scenario.

A total variance analysis of the dependent variable was carried out to validate the regression, which showed the extent to which (in percentage terms) the multivariate linear regression could be explained by the independent variables. This percentage is referred to as the r-squared coefficient of determination (Table 6), which shows $R^2_{adjusted}$ = 0.521. This result shows a good correlation between the variables, since 52.1% of the variability of the intention to purchase can be explained by the variables hedonic value and utilitarian value. In marketing literature, values greater than or equal to 20% for this coefficient are considered sufficient (Arruda, 2008; Bearden et al., 2011; Churchill, 1979; Nunnally, 1978).

On the other hand, the value of $R^2_{adjusted}$ also shows that 47.9% of the possibilities are not explained by the model, and may be related to several behavioral possibilities, such as social factors and the search for status by consumers. The decision factors within a convergent context take into account an emotional environment affected by a social scenario, given the green status and the differentiation that arises as a consequence of owning the product (Schuitema & De Groot, 2015; Arruda et al., 2017).

According to the results of the tolerance and variance inflation factor (VIF) tests, as shown in Table 7, there is no multicollinearity among the independent variables (Marôco, 2014).

4.1 Analysis of the proposed model

An ANOVA was carried out to validate or reject the hypotheses of the proposed model, generating Figure 2 and Table 8. It is possible to observe that for the scenario with the integration of green attributes in both the hedonic and utilitarian bases there is a greater purchase intention when compared to a product without green integration.

Table 6. Regression model summary.

R	R^2	R^2 Adjusted	Std. Error of the Estimate	Durbin-Watson
0.725	0.525	0.521	0.91471	1.809

Source: Author (2013).

For the utilitarian scenario, Figure 2 and Table 8 show that, for green integration, the purchase intention scored an average of 6.30 on a seven-point scale, while for nongreen integration the average was 5.66. It is also possible to conclude that, when compared, the average purchase intention was greater for devices with green attributes (p=0.022).

This result supports H_1, which stated that when a green attribute is added to a convergent utilitarian-based product, the purchase intention increases moderately. The reason for this increase is that the integration of green attributes is considered positive due to the fact that this addition is perceived as a new utility for a utilitarian-based product, which, according to Gill (2008), will increase the base value.

For the hedonic scenario, the purchase intention for green integration scored an average of 6.22, with an average of 5.37 for nongreen integration. These data confirm H_{2a}, which stated that purchase intention increases when green attributes are added to a hedonic base. The confirmation of this hypothesis entails rejection of H_{2b}, which predicted a reduction in purchase intention under this scenario. This increase can no longer be explained by the model proposed by Gill (2008), because it predicts that the addition of utilitarian functionality to a hedonic base will reduce its value and, consequently, the purchase intention.

Increased intention within the hedonic scenario can be explained with reference to the study by Okada (2005): green integration is used to reduce the guilt involved in purchasing hedonic or expensive products, which tends to hinder consumer behavior, where these products have a high purchase intention related to pleasure, fun, and status. Utilitarian attributes are well accepted as a justification for purchase, and ensure acceptance of the guilt involved. Thus, green attributes help the consumer justify their consumption.

Table 7. Collinearity tests.

Dependent Variable	Independent Variables	Collinearity Tests	
		Tolerance	VIF
Purchase intention	Hedonic Value	0.751	1.331
	Utilitarian Value	0.751	1.331

Source: Author (2013).

Table 8. Comparison of intention averages.

Base	Integration	Average	f
Utilitarian	Nongreen	5.6667	54
	Green	6.3019	53
	Total	5.9813	107
Hedonic	Nongreen	5.375	52
	Green	6.2288	59
	Total	5.8288	111
Total	Nongreen	5.5236	106
	Green	6.2634	112
	Total	5.9037	218
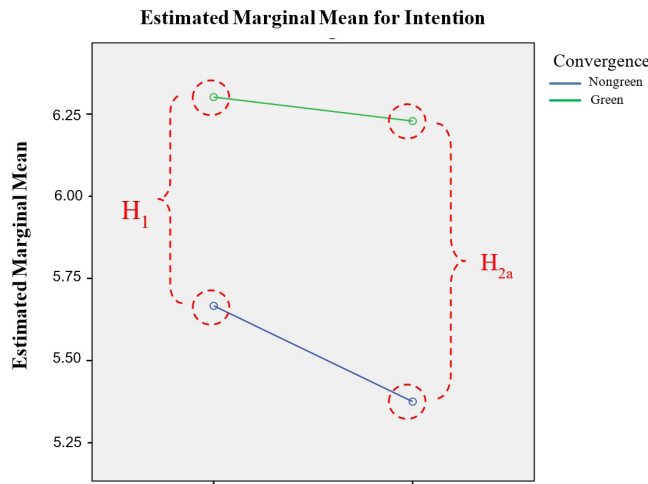
Figure 2. Intention evaluation. Source: Author (2013).

4.2 Scenario validation

A variance test was carried out to validate the hedonic and utilitarian preferences. Through this test it was possible to verify the level of understanding of the proposed scenarios—i.e., whether the hedonic and utilitarian stimuli proposed in the scenarios were actually perceived as such by the respondents.

Figure 3 shows the perceptions of the consumers in each hedonic-based (fun, pleasure, happiness) scenario. When the product was hedonic-based, its hedonic value is greater when compared to the utilitarian-based products, with or without green integration, in both cases. Thus, the proposed scenario is appropriate, since the results show that the products

described as having hedonic attributes were perceived as such by the respondents.

Figure 4 presents the perceptions of consumers for each utilitarian-based (necessity, importance, utility) scenario. It shows that, for utilitarian-based products, the utilitarian value is greater when compared to hedonic-based products, for both the nongreen- and the green-attributes scenarios. This validates the proposed utilitarian scenario, since the respondents perceived the products described as having utilitarian attributes as highly useful.

Figure 3 demonstrates an increase in the perceptions of hedonic value for the product with hedonic attributes, identifying that the attributes inserted within the research design correctly stimulated
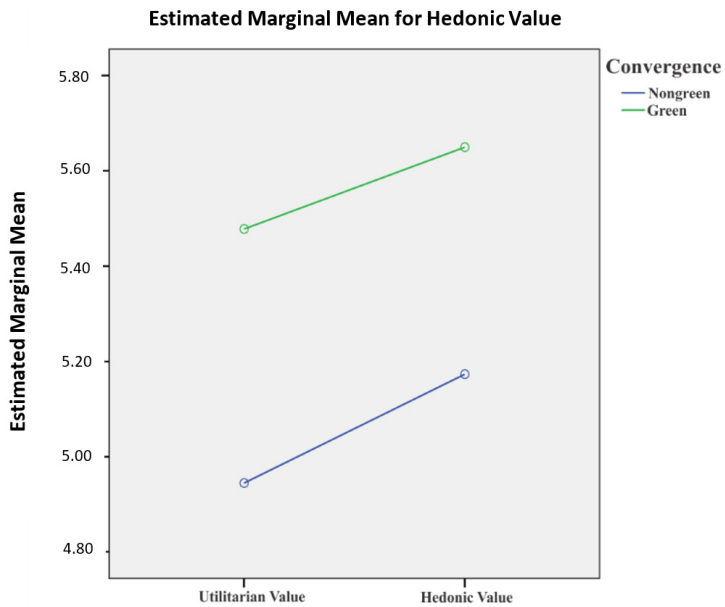
Figure 3. Perceptions in hedonic scenarios. Source: Author (2013).
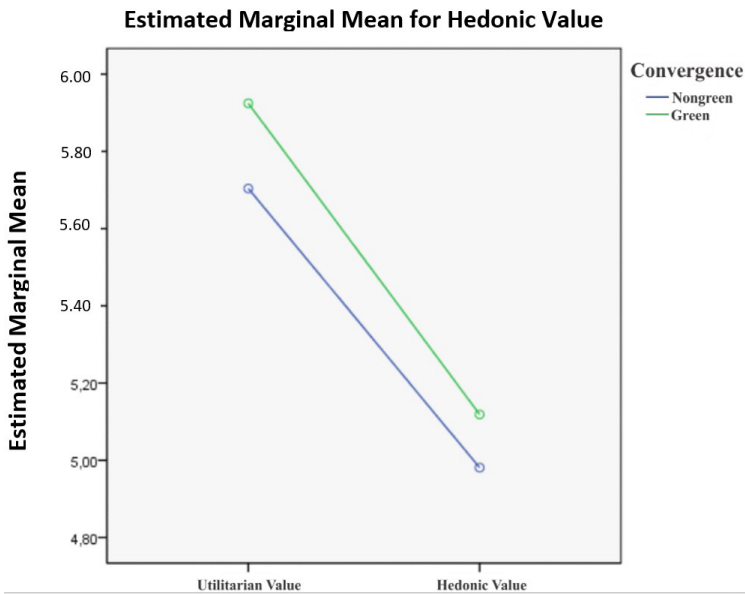

Figure 4. Perception in utilitarian scenarios. Source: Author (2013).

the participants. Similarly, in Figure 4, when the product had utilitarian attributes, the hedonic value perceived by the respondents decreased, proposing that the product was less valued as utilitarian when the stimulus was reversed.

In Figure 3, the green value is significant with respect to desire for the product, since it increases the product's hedonic perception in comparison to the standard convergent product without green attributes. In other words, a product with green attributes in addition to hedonic or utilitarian convergences has the highest perceived hedonic value. The same can be seen in Figure 4, for utilitarian value, as it shows (though to a lesser degree) that green attributes stimulate perceived hedonic value in comparison with utilitarian value.

5 Conclusions and implications

This study introduced a modern matrix, using quantitative research, to measure the hedonic and utilitarian purchase intention for technological products that integrate green attributes. It validates hypotheses developed from the theory that predicted an increase in the purchase intention for different base scenarios. One of the hypotheses was rejected, since they were designed in such a way that validation of one would lead to rejection of the other.

The findings show that, regardless of hedonic and utilitarian values, devices with green attributes have a higher demand, which suggests that consumers are increasingly developing ecological awareness. Green attributes, which for a long time were costly for companies to incorporate, are now synonymous with good businesses. As stated by Silva et al. (2015), companies have been striving to show societies their policies of good social and environmental practices, and are increasingly investing in sustainable products and services.

To extend the results and broaden this research, it is proposed that studies focusing on new products, and increasing the number of variables, should be developed to measure constructs such as social factors, since some studies have suggested that environmentally friendly products are acquired for fashion purposes (Yeoh & Paladino, 2013).

Among the study's limitations is the sample size, which was restricted due to the available time and resources; however, each research scenario was composed of at least 50 participants, exceeding the minimum suggest by Malhotra et al. (2005) for similar studies. Another limitation pertains to the fact that a single study was carried out, as opposed to studies in different situations, although multiple scenarios were developed to validate the findings. In future research, price and budget data can be added to the scenario, as well as validation of respondents' previous experience or perceptions by analogy, testing of which would broaden the model and enhance the integrity of the findings.

Some other aspects also remain to be discussed, such as the location and sample size, culture, and technological values related to the researched group. Therefore, it is also proposed that future studies expand the sample in order to analyze groups individually, as well as in aggregate, since although four scenarios were created in this research, they were grouped to better define the context of the current study.

In general, the study provides insights regarding marketing to and the behavior of technological consumers by revealing details on their decisions and intentions related to purchase in the context of high-technology products, hedonic/utilitarian values, and green integration. Modern literature has shown that many international researchers are following this correlation focus between hedonic value and use, and national marketing studies should continue this trend.

Acknowledgements

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