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Consumer behavior regarding wearable technologies: Google Glass

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Abstract

Purpose – This purpose of this study is to analyze consumer behavior in relation to Google Glass. The study considers the adoption and diffusion of the innovation, aspects related to technological convergence and the theories of utilitarian, hedonic and social value.

Design/methodology/approach – This qualitative, exploratory study uses the methodological approach of netnography via passive observation. Data collection was conducted using the social network Reddit over a period of about four months.

Findings – Three categories and two subcategories of consumers were found, namely, socially satisfied; socially constrained; and early adopters, divided into enthusiasts and visionaries.

Research limitations/implications – A limitation of this research pertains to the data collected regarding consumption preferences of users and potential adopters. No questions were created, but rather, discussions were selected, from the social network Reddit, that focused on factors pertaining to the theories studied.

Practical implications – The research brings an important insight regarding the launch of new products: to obtain a good market position for new devices, failures or inadequate perceptions that will negatively impact the technology's dissemination must be minimized.

Social implications – This study presents social value of technological consumption as a function of the conspicuousness, status and position of users who own devices that differ from those commonly available on the market.

Originality/value – This study reveals which elements exert the greatest influence on intention to consume so-called wearable technology. In particular, it analyzes consumer behavior in relation to Google Glass, evaluating the reasons that were perceived as positive and negative for consumers which blocked the technology launch in the market.

Keywords Social identity, Consumer behaviour, Netnography, Wearable technology, Google Glass

Paper type Research paper

1. Introduction

The current technological scenario appears to be financially stable for large technology companies. According to *Forbes* (2014) and *Brand Finance* (2014), a brand consultancy firm, among the ten most valuable brands in the world, only two do not belong to the tech sector. Both of these studies highlight Apple as the most valuable brand in the world, with a significant distance from the brand in the second place.

According to Degusta (2012), in the USA, it took nearly a century for landlines to reach saturation – i.e. the point at which new demand falls – while mobile phones have reached saturation in just 20 years and smartphones, Apple's main source of revenue, are well on their way to reducing this rate by half[1].

In this current technological scenario, for companies such as Apple to continue to lead as the most valuable brands in the world, they need to keep innovating in terms of developing not only more robust devices but also radically new technologies (Schumpeter, 1942; Govindarajan *et al.*, 2011) so that the differentiation is evident in the eyes of users.

Given the importance of consumers' perception of innovation, technological convergence (Han *et al.*, 2009; Lee *et al.*, 2013; Said and Adham, 2016) is a technique that has been widely used for products to appear radically innovative to the market; this facilitates these products' adoption, as their description of having multiple functions appeals to consumers through a perception of increased benefit.

In this context, convergence entails that several technologies, used for different purposes, are incorporated into a new one that combines the functionality of the previous ones (Kim *et al.*, 2005), making the convergent technology a multifunctional product (Harris and Blair, 2006). Because of convergence, most current technological products possess several attributes simultaneously, which generates different concepts and values such as utilitarian, hedonic and social attributes. In this scenario, a utilitarian attribute is defined as a product designed for individual or collective needs, such as devices intended to help with work, study and crucial functions related to personal, company or market development (Slama and Singley, 1996; Okada, 2005). When a product is intended for entertainment, fun or pleasure, it is defined as hedonic; when the individual derives value from obtaining a common possession, being included in a group, or obtaining social differentiation, it is defined as fashionable (Katz and Sugiyama, 2006). Hedonic and social factors differ, although they share the same function: to provide some form of pleasure, whether personal or social, and the need to demonstrate ownership to other people (Arruda Filho, 2008; Casaló *et al.*, 2017).

Within this scenario of values and constant market updates, there is a growing focus on so-called wearable technologies – i.e. electronic technologies that are used directly on the body as accessories (bracelets, watches, glasses, etc.), clothing or shoes (Yaoyuneyong *et al.*, 2016). These devices are supposed to function as true body extensions (and, in some cases, the mind), proposing a new form of connectivity and interaction (Dunne, 2004; Mann, 2013).

Although not yet common, the differentiated design in a wearable technology is a critical factor regarding the adoption of these new technological devices. Therefore, the question is which characteristics positively and negatively influence current adoption of wearable technologies by consumers? The objective of this study is to answer this question and discover which elements exert the greatest influence on the intention to consume equipment in this niche, which will allow practitioners to predict which devices will be adopted in the coming years by certain user groups (Gammarano *et al.*, 2012).

In this context, Google's "smartglasses," Google Glass, were chosen as the research focus in this study. The device comprises a lens that streams images directly over the eye of the user with the aim of facilitating access to online information such as messages, e-mails, news, research, weather, maps and routes, in addition to taking photos and recording videos

from the user's point of view. Google Glass was chosen as the focus of this study owing to the fact that, before its launch, it was considered a potentially disruptive wearable technology, predicted by many experts to be one of the most important innovations of 2012 (Time, 2012; Mangalindan and Wagner, 2012), though it ultimately was not released as planned in 2015.

To analyze consumer behavior toward the selected wearable technology, exploratory qualitative research was conducted, with netnography used to collect data. This methodology aims to study consumer behavior through observations of online communities (Kozinets, 2002, 2010) to discreetly obtain deeper insights into consumers' opinions, motivations, problems and concerns so as to later categorize types of consumers and the values that influence their use and consumption of technology.

This article proceeds as follows: initially, the current context regarding the development and adoption of technologies is presented, followed by the main theories regarding consumer intention (diffusion and adoption of innovative technologies, technological convergence, utilitarianism, hedonism and others that generate marketing influences on consumer behavior). Next, the methodology is described in detail to confirm its suitability for the study. The results of the study are then presented sequentially and divided into categories of users within this technological consumption environment. Subsequently, a discussion is carried out based on the data collected and related to the marketing literature, focusing on the users' strengths and weaknesses. Finally, the outcomes of the study are discussed, and future research proposals for this ever-evolving high-technology scenario are presented.

2. Theoretical background

2.1 Diffusion and adoption of innovative technologies

Product innovation generates growth for organizations because of the fact that products perceived as innovative stimulate the sales process. Innovative technology-based products bring a high degree of update to the market, causing innovation to be a key factor leading to customer acquisition and increased sales in this highly competitive sector (Freeman and Soete, 2008).

Innovation refers to an idea, practice or object that is perceived as new by the consumer (Rogers, 2003; Godin, 2009). A product will be considered innovative by an individual if its characteristics and benefits are new compared to the known standard.

Rogers (2003) stated that acceptance of an innovation depends on five critical factors: relative advantage (obvious benefits over prior product, service or behavior); compatibility with current values, past experiences and needs of potential adopters; complexity (ease of understanding and use of technology); trialability (possibility to experience the innovation before acquiring it); and observability (visibility of the innovation's benefits).

Diffusion is a special type of communication in which the message is related to a new idea (Rogers, 2003; Moore, 2014), thus bringing a certain degree of uncertainty. As more information is exchanged, the degree of uncertainty involved in adopting it decreases (Harris and Blair, 2006).

Solomon (2011) explained that while mass communication channels tend to be considered fast to inform thousands of potential adopters of the existence of an innovation, communication is more effective when agents are part of the same social group, share the same interests and have something in common that binds them. Thus, special emphasis must be given to the importance of the potential adopters' social networks and the influence of opinion leaders and groups in which adopters participate, as persuasion (development of an innovation friendly attitude) influences the perception of innovations (Katz *et al.*, 1963).

Rogers (2003) also identified that early adopters of technology significantly differ from other consumers; in particular, they have high levels of social participation and interconnectivity with the social system; are cosmopolitan; have high levels of exposure to mass media and communication; are often opinion leaders; have high purchasing power; and have a greater ability to deal with changes and uncertainties. Because of all these characteristics, early adopters play a fundamental role in the innovation diffusion process via stimulating or discouraging the adoption of technology (Godin, 2009; Solomon, 2011; Casaló *et al.*, 2017).

2.2 Technological convergence
Current technology products have been increasingly extending their functional capabilities by using technological convergence, offering a range of combined services with full systems integration, and products that offer multiple tools via a single platform (Nunes *et al.*, 2000; Harris and Blair, 2006). Thus, technological devices such as smartphones enable access to telephone networks, the internet, GPS, digital camera, camcorder and music and video players, which are characteristics that add value to the product and increase the chance that customers will choose to purchase this type of multifunctional device even if individual products possess better qualities and are more robust because of their specific uses (Arruda Filho *et al.*, 2008; Lee *et al.*, 2013). The preference for devices with integrated attributes is also related to mobility, as owning a single device with several functionalities allows for greater mobility by reducing the amount of equipment that needs to be carried (Kim *et al.*, 2005; Han *et al.*, 2009; Said and Adham, 2016).

Consumer preference for convergent devices, when compared to specific functional devices, is justified by the belief that devices with integrated features will be used more often (Nunes, 2000). However, it is also important to point out that the perception of risk of functional compatibility regarding dedicated devices decreases with integrated devices, as the latter have greater compatibility with various systems (Harris and Blair, 2006).

However, the more functionalities a product has, the less easy it is to use (Gill, 2008), as the product will either share the same input means to perform a number of tasks – e.g. holding a button for few seconds performs a task other than that that performed by simply tapping the button – or have a greater amount of data input means. Therefore, manufacturers of technologically converged equipment should develop new products while observing the necessary balance between the various functionalities of the device and its ease of use for the consumer.

2.3 Utilitarianism and hedonism in consumption practices
To analyze technology in terms of consumers' preference for hedonic versus utilitarian products, it is important to highlight the difficulty in dissociating purely utilitarian from purely hedonic behavior, as they often overlap (Addis and Holbrook, 2001).

Utilitarian consumption is explained in the theory of rational action by Ajzen and Fishbein (1980), which assumes that the consumer consciously considers the consequences of alternative behaviors and chooses the product that leads to the most desirable consequences through its functionality. However, Okada (2005) explained that people are naturally predisposed to fun and, for that reason, seek pleasurable experiences in their routines. While the procedure of choosing products is usually defined by the effort to acquire the best item for the lowest price, by increasing hedonic attributes in utilitarian-based products (e.g. a cell phone with an integrated camera), companies facilitate an increase in the consumers' value perception of the product (Gill, 2008; Said and Adham, 2016).

However, in the acquisition of hedonic-focused products, the unnecessary (utilitarian) nature of use establishes a sense of guilt for consumers (Okada, 2005; Park, 2006), giving rise to a need to justify them as utilitarian products by looking for utilitarian features that justify their purchase/use (Okada, 2005; Arruda Filho *et al.*, 2008). Consumers build their choices according to their needs and interests, whether professional or personal, so the interconnection of multifunctional products with both utilitarian and hedonic characteristics facilitates the decision to purchase them (Arruda Filho, 2012).

2.4 Consumption and social identity

Another important concept is that of consumption as a symbol, as opposed to strictly utilitarian purchases. The choice of products in contemporary consumption is associated with different meanings and is an individual decision by which consumers define and redefine their identities (Katz and Sugiyama, 2006; Retondar, 2008; Casaló *et al.*, 2017).

Products are commonly used as evidence of users' lifestyles, identities and world views (Veblen, 1899; Baudrillard, 1996; Katz and Sugiyama, 2006). Some consumers use their products as a form of symbolic expression and as extensions of their own self, generating social behaviors, motivated by owning a product that results in social prestige (Belk, 1988; Slater, 2002). Veblen (1899) also theorized on conspicuous (or ostentatious) consumption – consumption whose objective is not to enjoy an item's quality but to exhibit it as a sign of public distinction, a form of reputation. For Veblen (1899), individuals spend money on superfluous things to earn a good reputation, consuming them as a way to evidence their wealth or power, rather than spending on necessary things.

The consumption of particular goods is not only a way for those who actually have power and money to exhibit status but also a way for those who do not have to emulate such status (Katz and Sugiyama, 2006). In this context, it is clear that consumer objects' pure material value is abandoned in favor of social meanings, or symbols of social stratification (Slater, 2002).

Therefore, the consumption of goods is the result of differentiation, "a function of social prestige and hierarchical distribution" (Baudrillard, 1996, p. 10). The value of exchange surpasses pure necessity (the value of use), providing the possibility of social distinction and an ideology linked to it. Thus, consumption is related not only to the utility of the object but also to the social identity that it represents (Solomon, 2011).

In this way, the continued search for new equipment becomes common in modern society, and the search for social differentiation is one of the main reasons why people adopt new technologies, acting more as a influence criterion on the consumer's perception of the product's value (Arruda Filho *et al.*, 2008).

Figure 1 presents the semiotic framework of consumption theory in this technological and innovation context. It is clear that convergence has several characteristics that stimulate and motivate consumers' interests, although there is a perception of risk involved, both in terms of the number of functions and their diversity and innovation (Harris and Blair, 2006; Kozinets *et al.*, 2017). The increased or reduced perception of this risk impacts the perception of the product, which can be seen as innovative and exciting or even as a danger to the user because of its high risk. The perception of innovation is restricted according to the intrinsic values of the user.

As shown in Figure 1, for adoption to take place, and based on the type and form of adoption, there is another source of moderation within the social context in which values such as extension of self, conspicuous value, status and issues related to the disposition of the consumption or use scenario for the group in which the consumer is inserted will

eventually interfere in the reduction or expansion of adoption because of constraints, or even prestige, in owning a specific product (Costa *et al.*, 2017).

3. Method

This work presents an exploratory qualitative study that used the netnographic approach for data collection. This method, proposed by Kozinets (1997, 2002), seeks to understand consumer behavior by observing online communities. Netnography entails the adaptation of ethnographic research to the online field; the study method seeks to understand people in groups through the study of culture and to conduct research on behavior, customs and beliefs acquired over time and shared by the group (Angrosino, 2009). While a statistical model based on quantitative research seeks to identify mathematical relationships that describe cause-and-effect explanations or interactions between variables that can be theoretically connected, netnography seeks to understand certain behavior through detailed research in the context in which the studied group is inserted (Kozinets, 2010). In marketing research on consumer behavior, netnography has proven very interesting, providing in-depth clarification of the context under analysis. This type of research has a lot of potential for marketing, as it helps to explain the various forms of modern consumption (Kozinets, 2002, 2010).

In the virtual environment, it is possible to textually observe consumer and user behavior in an influence-free scenario. Consumers position themselves in a certain way regarding the object under research, presenting their forms of use, satisfaction and dissatisfaction (Arruda Filho *et al.*, 2010). The netnographic research model also makes consumer behavior research more accessible, less invasive and less expensive compared to other research methods, as the information used is publicly available on the internet.

3.1 Passive observation

To analyze consumer behavior regarding Google Glass, this research used the social network Reddit, which is a community of forums on which users, in addition to commenting, can vote, positively or negatively, on content posted by other users. The highest voted comments are highlighted on the website. The social network also has subcommunities, called "subreddits," which are created by users for discussions on specific topics. The subreddit www.reddit.com/r/googleglass, used in the data collection, had 6,743 subscribers
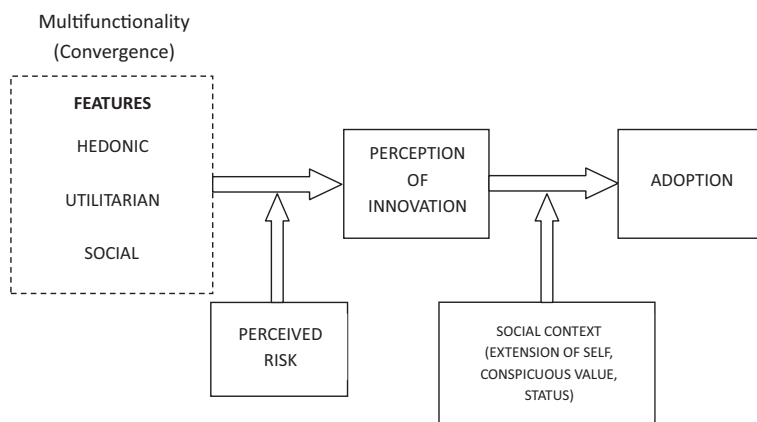

235

Figure 1.
Semiotic consumption framework in a technological and high innovation context

(people following the content published) at the time of data collection. Reddit was chosen because it is notorious for its open nature, popularity and ability to serve niche purposes by using the subreddits. Its social evaluation system also assists in screening discussions and relevant comments on the subject discussed.

This project followed the netnographic method adopted by Langer and Beckman (2005), who used a "passive observation" procedure consisting of the observation of a virtual community by the researcher without revealing or interacting with its participants. This differs from what Kozinets (2002) proposed initially.

Braga (2006) pointed out that observing can also be a form of participation even though the researcher preserves his/her identity, observes without being observed and does not influence the dynamics of the interaction he/she wishes to study. This "invisible" participation in the group enables understanding of the structural elements of the researched area, with the subsequent in-depth elaboration of factors involving consumption shared by the participants in question.

The use of a specific social network, as per this research, demonstrates reliability based on the content described and evaluated from the set of participants who are part of the studied network, which represents the chosen cultural research community. The diversity of the participants and homogeneity of their participation in the network are facts that are taken into account before deciding which data should be used for analysis. The richer the community, in terms of diversified and up-to-date participation, the greater the contribution of content and the resultant symbolism and meaning to network participants. Obviously, some product users and consumers are not part of the network, but the network serves as a sample in which specific participant groups are always present. In today's technological society, a large number of consumers contribute and seek information online, which greatly facilitates the use of netnography for specific consumer studies (Kozinets, 2010; Kozinets et al., 2017).

The research was conducted in an ethical way, and even though the data were published on the internet, specifically the open social network Reddit, details on the social network's participants were not disseminated during research – i.e. personal data, where publicly shared on Reddit, were still protected by the researchers. Furthermore, the work does not seek to embarrass or denigrate the subjects, and as behavior was studied not for a specific person but in terms of collective action, this further preserved the confidentiality of the participants.

3.1.1 Data collection and analysis. Data were taken from eight different discussions, containing 143 comments from 86 users and a total of 594 points (community votes in favor of posts). Data were collected for discussions with at least seven comments, related to usability, motivations and concerns or dissatisfaction regarding Google Glass.

From the downloaded data, the total material used corresponded to 22 pages in Word format (Times New Roman, font size 12, justified). The netnographic data were placed in a file corresponding to two-thirds of each page, leaving the remaining one-third for annotations that formed the basis for coding the search results.

Table I presents data regarding the research developed with information regarding research on these discussions. The coding approach used did not require any software. Thus, each discussion was initially read, and notes were made on each comment, including some impressions and indications for coding the results. Afterwards, data were categorized according to the main subject discussed in relation to consumers' perceptions and justifications.

Table II shows the topics identified in the discussions analyzed, the number of individual posts (i.e. the number of individuals who actively participated [posted comments]), the total

Social network used for data collection	Reddit	Google Glass
URLs	www.reddit.com/r/googleglass/comments/1brsuk/ just_had_my_first_google_glass_in_the_wild/ www.reddit.com/r/googleglass/comments/1q6w6v/ why_did_you_buy_google_glass_and_what_do_you_do/ www.reddit.com/r/googleglass/comments/1x9gfa/ first_time_actually_wearing_glass_out/ www.reddit.com/r/googleglass/comments/1xo3u9/ glass_in_a_system_administrator_world/ www.reddit.com/r/googleglass/comments/1xx70p/ google_glass_in_public_what_are_your_experiences/ www.reddit.com/r/googleglass/comments/1y97sh/ so_google_just_emailed_me_about_becoming_an/ www.reddit.com/r/googleglass/comments/1ymubk/ so_i_got_the_thin_frames_and/ www.reddit.com/r/googleglass/comments/1ynfnb/ thinking_about_getting_glass/	
		237
Total number of discussions used in analysis	Eight discussions, with six different storylines related to usability, motivations, concerns or dissatisfaction regarding Google Glass	
Language of discussions	English	
Data collection period	October 22, 2014 to February 27, 2016	**Table I.** Primary research
Source: Authors' elaboration (2017)		data

number of posts (the total number of discussion comments), the total number of words and the total community votes on the discussion posts. Words that demonstrate consumers' feelings on the topic of interest are highlighted to identify the values and benefits perceived or experienced by each consumer group. Categories were created based on analysis of the contents collected to segment specific groups present in the discussions. All data were reviewed to interpret which categories would best describe the different types of technological consumers.

Based on literature on integrated technology and consumer behavior and the technological acceptance model for convergent structures, in addition to literature on justification for use, the acceptability and diffusion of the technology were assessed, as well as hedonic and utilitarian factors and social values relevant to the decision to use Google Glass. This reveals how consumers decide to use Google Glass and the main consumption values for such wearable technology.

The diverse information and data collected, based on discussions about the subject created from keywords regarding use, satisfaction, dissatisfaction, motivations and desires about the subject under study, enabled us to identify multiple user categories in this technological context. At the moment of saturation – i.e. when groups could no longer be diversified, and the same groups described themselves in a similar way – the number of discussions was considered adequate for the research.

The results found according to the characteristics of participants of the studied social network demonstrate the theoretical validity of the approach used in this research. From the initial concepts, the environment variables and scenarios that affect these key concepts, it is clear that there are certain behaviors that bring together one or more theories to construct user profiles/categories within the research subject.

No.	Topic	Title of discussions	No. of unique posts	Total posts	Words	Total points
1	Enthusiasm toward technology	Earlier I saw Google Glass for the first time . . . I feel like a little kid.. I am 31	9	14	586	78
2	Justification for use	Why did you buy Google Glass and what do you do with it now?	8	13	1,393	46
3	Experience in public use	First time using Google Glass outside	19	26	2,436	121
4	Usefulness of technology	Google Glass in the world of a systems administrator	5	7	332	17
5	Experience in public use	Google Glass in public – what are your experiences? (discussion)	19	31	1,812	89
6	In search of more information	So, Google just sent me an e-mail about how to become an Explorer. What do I do?	16	22	1,012	96
7	Influence of appearance on the decision to use	So, I got the "thin" frame and...	14	23	1,076	136
8	In search of more information	Thinking about acquiring Google Glass	5	7	366	11
	Total		95	143	9,013	594

Source: Authors' elaboration (2017)

Table II.
Topics identified, discussion titles and details on posts

4. Interests based on valuation perceptions

Based on the data collected and the method proposed, three categories and two subcategories of consumer behavior were found for Google Glass consumers. Fragments of the collected posts were used in each category and subcategory developed supported by literature and theories related to marketing and technological consumer behavior. Interpretations were made taking into account the previous literature regarding consumption values (Kozinets, 1997, 2002, 2010; Arruda Filho *et al.*, 2008, 2010) and technological preferences (Arruda Filho and Lennon, 2011; Lima and Arruda Filho, 2012; Gammarano *et al.*, 2012; Dias and Arruda Filho, 2013).

First, a brief explanation of the elements of each category, supported by literature, is presented. Then, example participant comments in discussions are provided, demonstrating the integration of members of the community in the category, which described the page number and line where the poster is presented at the database that was used. Originally, comments were presented in English; to improve understanding for Brazilian readers, they were translated into Portuguese and later translated back into English for International readers. After presenting example comments, these are discussed in relation to the research topic and prior literature, leading to an interpretation of the decisions, values and choices of the consumers under study.

4.1 Socially satisfied

This first category represents consumers who are motivated by the social differentiation provided by technological products. Owning a device that few people possess, which arouses curiosity in others, causes these users to feel socially valued, adding pleasure to their possession of the product (Veblen, 1899; Bourdieu, 1983; Baudrillard, 1996; Casaló *et al.*, 2017).

> It's as if you were holding something that people thought was just a rumor or fiction. When they see it, they're dazzled and want to ask you 1,000 questions. I love that. P. 04, Lines 34-37.

> Haha, it's almost as if you were a celebrity, everyone is looking at you and they want to talk to you about them! P. 09, Lines 27-28.

> [...] every time I go out (to the mall, shop, restaurant, etc.) I have to stop once or twice every 10 minutes because of the people who become very excited to see Glass. [...] even yesterday a group of people asked to take a picture with me! P. 11, Lines 42-44 and 48-49.

It is clear from the comments above that these consumers enjoy Google Glass because of the social differentiation it gives them. During data collection, much about the product was mentioned in mass media channels, although acquiring it was not as easy as for several other technologies provided by Google (e.g. Orkut, Gmail, Google+, etc.). During the early stages of innovation diffusion several invitations were distributed, which acted as a prerequisite for users to obtain the technology – this was essentially a strategy to increase expectation and arouse curiosity regarding the product, promoting word of mouth (Ahuja *et al.*, 2007). In addition, the price of the "Explorer" version of Google Glass – US$1,500 – contributed to its social distinction (Solomon, 2011).

4.2 Socially constrained

Consumption practices are fraught with symbolism (Baudrillard, 1996; Slater, 2002). Thus, a product can be well liked by a social group and perceived as negative or strange by the "masses," making its public use an embarrassment.

The sad reality, however, is that for each one of us that would smile and approve it, there are many people who would disapprove of and reject it. P. 01, Lines 14-16

Today, I decided to be brave and use Glass while performing some tasks (going to the grocery store and Bed Bath and Beyond[2]). For people who use Glass every day, this may seem unimportant, but I really had to have a lot of willpower to overcome the embarrassment (. . .). P. 05, Lines 37-41

The fact that Google Glass has an integrated camera, which is constantly visible, located above the user's right eye, gives a feeling of discomfort to many people who believe in the possibility of being filmed. Thus, some Google Glass users wear "disguises" to make the use of the product less obvious.

In addition, its differentiated appearance from ordinary eyeglasses is considered "strange" and incompatible with current fashion standards. Therefore, Google Glass faced compatibility issues regarding existing social values, which hindered diffusion of the innovation (Alba and Hutchinson, 1987; Rogers, 2003).

It's unpleasant to look around. People avoid me, because they think I'm a constantly recording robot (. . .). No one looks me in the eye. Your eyes are facing the camera. P. 14, Lines 27-28 and 32-33

I'll probably spend a year or two using Glass just in the car and around the house, until 'the masses' really understand what it is and what it does, because I would not be good at overcoming embarrassing situations (. . .). P. 09, Lines 21-24

I really have not overcome the social embarrassment, so my Glass will now stay in the stand for a few months. I'll pretty much just wear it at 'events' – for example, I took it to a football game, a concert, that sort of thing. I noticed that you can 'camouflage' it simply by wearing the sunglasses included in the package. I would say the number of people who understand what it is for just dropped by half or more. I have come to the conclusion that the metal rod itself is very strange not to be noticed. P. 10, Lines 19-27

It is important to note that Google made some models of frames available for the Glass with the intention of overcoming its incompatibility with fashion; however, as reported by the user in the previous comment, the device frame itself is very "strange".

I don't have the Glass or wear glasses, but if I had, I think I would end up getting the frame. To me, this seems a bit less clumsy and indiscreet than the standard version, which looks like a cybernetic tape. P. 19, Lines 25-28

I recently purchased my 'thin' frame as well. I'm enjoying the elegant look it provides. The frames certainly make Glass look more [. . .] "normal". P. 20, Lines 13-15

Once again, in line with the literature (Baudrillard, 1996; Slater, 2002; Katz and Sugiyama, 2006; Solomon, 2011), it is possible to note the importance that current consumption assumes in the formation of social identity. In the above comments, we can see how important the appearance of the product is (Katz and Sugiyama, 2006), as what is under discussion is not the usefulness or practicality of the technology but rather the "robotic" image of the product, which is perceived as a negative factor. What these consumers expect is a product more suited to current fashion standards, leading to a "normal" appearance.

4.3 Early adopters
The success of a product depends not only on how good the idea is but on consumers realizing their need for that product (Davis, 1989; Rogers, 2003). Thus, early adopters are

responsible for deciding whether the technology will have a practical application, and, consequently, whether it is going to be a market success or failure (Bass, 1969; Rogers, 2003; Godin, 2009). This category of consumers is subdivided into two types: enthusiasts and visionaries (Godin, 2009).

4.3.1 Enthusiasts. Enthusiasts are the first to adopt innovations. They show entrepreneurial characteristics, such as low risk aversion and a tendency to make daring choices. They have more cosmopolitan characteristics, access more mass media and have great interaction through distinct social groups that are often disregarded by other members of the social system, but they play an important role as a gateway to concepts developed outside the system. In general, these uses are in better economic positions, which allow them to absorb financial losses in the case of wrong adoption decisions (Rogers, 2003; Godin, 2009; Moore, 2014):

[. . .] I watched the day it was announced on I/O 2012[3]. I instantly wanted one, the ability to see from other perspectives and see how people act/work/do things, was more than enough. P. 03, Lines 02-06

[. . .] it's amazing to see it firsthand. We are pioneers in a new field of technology. We can shape how people will use technology in the future. P. 03, Lines 18-19

I have 1500 dollars available to purchase it. I want to have fun with it and I have no ideas to develop apps for it recovering my money. I want to give it a chance using it because I love the idea behind it. I suspect the final version will be half the price, but I really cannot wait to play with it. P. 22, Lines 25-28

For this category of consumers, it does not matter that the product has no market; what is important is the idea. When enthusiasts like technology, they receive the concept as a brilliant idea. However, conquering the market does not depend on this type of consumer alone, as their focus is not on its practical application (Godin, 2009; Moore, 2014).

4.3.2 Visionaries. Visionary consumers are more integrated into the social system than enthusiasts and are generally respected and part of the group of opinion makers. By focusing more on local relationships, despite having cosmopolitan characteristics, they act as a link between agents of change for enthusiasts and others in the group, and they play a very important role in triggering or preventing the process of diffusion, reducing uncertainty and acting as approvers or innovators (Rogers, 2003; Godin, 2009; Yaoyuneyong *et al.*, 2016):

If you're not a developer, ignore it. (. . .) It's not ready. The practical applications are almost nil, even for a technophile. The battery life is horrible. People tend to treat you poorly when you are using it, at least in my circumstances (. . .). If you are a developer looking to make applications – go ahead. But if you just want a better and newer gadget, buy a good smartphone and a GoPro+bracket for your head. P. 17[4], Lines 11; 18–20; 22–24

Just wait. I'm also not a developer. I like to play with it and try things, but I mainly use them passively for notifications and other things. While I ultimately decided not to return it, it is not worth 1500 dollars (. . .). The consumer version will likely be much more affordable, and it's a definitive purchase (for me, at least) if it's for less than 500 dollars. P. 17, Lines 01–04; 06–08

I'm not a developer, just a technology fanatic. They are not worth 1500 dollars. I love it and I wear it every day, but it's a silly buy for half that price. It just doesn't accomplish enough. P. 22, Lines 04-06.

To retain a reference position, visionary consumers are critical of innovations (Rogers, 2003; Godin, 2009). As per the last two comments, while these users opted not to return the product, the latter even expressing "love" for it, it can be seen that consumers evaluate the practicality of the innovation and judge its potential merits for the rest of the population.

Another point to be noted is that, for these consumers, the relative advantages (Rogers, 2003) of the product are not properly assessed. Even in the first comment of this subcategory, the consumer suggests that those who are in search of a technological update acquire a GoPro camera and a good smartphone, which, the user says, would make for a more advantageous purchase. Thus, in addition to the problem of compatibility with current social values, Google Glass, sold at a price of US$1,500, presents poor relative advantage, which is another problem for diffusion of the innovation (Rogers, 2003; Moore, 2014). Also perceived in this discussion, the main positioning of users are related to justification for use (Okada, 2005), proposing that in case the consumer has an interest in developing applications for this emerging technology, they can reduce costs previously spent on the device.

5. Conclusion

In this article, the behavior of consumers of wearable technology was analyzed through a netnographic study based on Google Glass. The analysis sought to determine the main values for the acquisition and use of this new technology, supported by theories of preference for consumption of convergent devices; consumption based on utilitarian, hedonic or social value; and the theory of adoption and diffusion of innovation.

The results show that Google Glass faced a series of problems related to adoption and diffusion of the innovation. These problems pertain to the product's incompatibility with current standards in society (fashion and privacy) and poor evaluations of the relative advantage of the technology, mainly because of its high price, as it is possible to acquire much more robust products that would essentially serve the same function (e.g. state-of-the-art smartphones combined with an action camera).

So far, all the functions that Google Glass offers are available in alternative technologies (smartphones and action cameras). The difference lies in the projection of images, which in the case of Google's smartglasses stay permanently available over the user's right eye. Therefore, its usefulness is based around convenience in accessing information. However, this subject was poorly debated within the studied community, to the point that there were insufficient comments for a group of "utilitarian users" to be created.

Aspects focused strictly on hedonism (fun) practices with Google Glass were also very rarely commented on and almost always pertained to the ease of recording images, which gave users a quick and spontaneous way of generating memories. However, these aspects were again not sufficiently discussed for the creation of a category dedicated to this area.

On the other hand, social aspects regarding purchase were widely discussed. For one group of consumers because of the rarity of the product and the rise of wearable technology, Google Glass has high social value. For an opposing group, the wearable device was too highly visible; these users would prefer the product to be more discreet and in accordance with the fashion standards in force for glasses.

The theoretical implications of the study are thus divided into two fundamental points:

(1) The social value of technological consumption as a function of the conspicuousness, status and position of users who own devices that differ from those commonly available on the market.

(2) The functional meaning (utilitarian) of the product, which unfortunately was not well debated, or even described by Google before this test with users, has not been adequate to guarantee the use of the product.

The risk involved in the use of the product, as well as the social context, undermined the reliable use of the device.

As a managerial implication, the article brings an important insight regarding the launch of new products: to obtain a good market position for new devices, failures or inadequate perceptions that will negatively impact the dissemination of the technology must be minimized.

A limitation of this research pertains to the data collected regarding consumption preferences of users and potential adopters. No questions were created but rather discussions were selected, from the social network Reddit, that focused on factors pertaining to the theories studied. In future research, it would be useful to pose questions directly to members of the social network to more precisely evaluate the desired attributes.

Finally, we can conclude that Google Glass still faces several difficulties in conquering the market; despite being considered a great idea, so far it has no real practical applications for the general public, especially given its cost/benefit ratio, which is perceived as unbalanced, and its highly visible design. Within this scenario it is clear why the product has not taken off, in addition to the fact that it took too long to be released onto the market and was recently interrupted (cancelled in 2015 by Google). The delay in development, in addition to acceptability issues, led to a failure in the attempt to assert its position in the market, and Google Glass has currently been withdrawn from sale.

Notes

1. The iPhone is responsible for 57% of the company's revenue (Apple, 2014).

2. American company focused on the sale of domestic products.

3. Google I/O is a developer conference that has been organized annually by Google since 2008. The goal is to guide programmers to develop applications for Google systems. At this conference, Google also announces new versions of its systems and new products.

4. GoPro is a compact mobile action camera that records images from unusual points of view. Users can strap GoPro to their own body, vehicles, instruments and other places by using the different media available for the device.

References

Addis, M. and Holbrook, M.B. (2001), "On the conceptual link between mass customization and experiential consumption: an explosion of subjectivity", *Journal of Consumer Behavior*, Vol. 1 No. 1, pp. 50-66.

Ahuja, R., Michels, T., Walker, M. and Weissbuch, M. (2007), "Teen perceptions of disclosure in buzzmarketing", *Journal of Consumer Marketing*, Vol. 24 No. 3, pp. 151-159.

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.

Alba, J. and Hutchinson, J. (1987), "Dimensions of consumer expertise", *Journal of Consumer Research*, Vol. 13 No. 4, pp. 411-454.

Angrosino, M. (2009), "Etnografia e observação participante", *Tradução José Fonseca*, Artmed, Porto Alegre, RS.

Arruda Filho, E.J.M. (2008), "Incluindo o fator social no modelo de aceitação tecnológica Para estruturas convergentes", *Revista De Administração*, Vol. 43 No. 4, pp. 315-330.

Arruda Filho, E.J.M. (2012), "Hedonic and social values supporting utilitarian technologies", *International Journal of Innovation and Learning*, Vol. 12 No. 2, pp. 160-180.

Arruda Filho, E.J.M., Cabusas, J.J. and Dholakia, N. (2008), "Social factor versus utilitarian technology: social marketing versus utilitarian market", *Jistem Journal of Information Systems and Technology Management*, Vol. 5 No. 2, pp. 305-324.

Arruda Filho, E.J.M., Cabusas, J.J. and Dholakia, N. (2010), "Social behavior and brand devotion among iPhone innovators", *International Journal of Information Management*, Vol. 30 No. 6, pp. 475-480.

Arruda Filho, E.J.M. and Lennon, M.M. (2011), "How iPhone innovators changed their consumption in iDay2: Hedonic post or brand devotion", *International Journal of Information Management*, Vol. 31 No. 6, pp. 493-501.

Bass, F. (1969), "New product growth for model consumer durables", *Management Science*, Vol. 15 No. 5, pp. 215-227.

Baudrillard, J. (1996), "Função-signo e lógica de classe", *Baudrillard, J a Economia Política Dos Signos*, Editora Martins Fontes, São Paulo, SP, pp. 9-49.

Belk, R.W. (1988), "Possessions and the extended self", *Journal of Consumer Research*, Vol. 15 No. 2, pp. 139-168.

Bourdieu, P. (1983), "Gostos de classe e estilos de vida", in Ortiz, R. (Ed.), (Org), *Pierre Bourdieu: Sociologia*, São Paulo, SP, pp. 82-121.

Braga, A. (2006), "Técnica etnográfica aplicada à comunicação online: uma discussão metodológica", *UNIrevista*, Vol. 1 No. 3, pp. 1-11.

Brand Finance (2014), "The world's most valuable brands", available at: http://brandirectory.com/league_tables/table/global-500-2014

Casaló, L.V., Flavián, C. and Ibañez-Sanches, S. (2017), "Understanding consumer interaction on instagram: the role of satisfaction, hedonism, and content characteristics", *CyberPsychology, Behavior & Social Networking*, Vol. 20 No. 6, pp. 369-375.

Costa, E.M.S.D., Arruda Filho, E.J.M. and Botelho, D. (2017), "Percepção do prestígio como valor motivador das intenções de consumo de produtos tecnológicos realmente novos", EnANPAD 2017, São Paulo, 01 a 04 de Outubro. Anais. . ., *Rio de Janeiro, RJ*.

Davis, F. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340.

Degusta, M. (2012), "Are smart phones spreading faster than any technology in human history?", available at: www.technologyreview.com/news/427787/are-smart-phones-spreading-faster-than-any-technology-in-human-history/ (accessed 25 May 2014).

Dias, E.J.P. and Arruda Filho, E.J.M. (2013), "Comportamento do consumidor no setor educacional: Adoção e aceitação de novas tecnologias", *Pretexto*, Vol. 14 No. 2, pp. 77-95.

Dunne, L.E. (2004), "The design of wearable technology: addressing the human-device interface throught functional apparel design", Master's thesis, Cornel University, New York, NY.

Forbes (2014), "The world's most valuable brands", available at: www.forbes.com/powerful-brands/list/

Freeman, C. and Soete, L. (2008), *A Economia Da Inovação Industrial*, Unicamp, Campinas, SP.

Gammarano, I.J.L.P., Arruda Filho, E.J.M. and Farias Filho, M.C. (2012), "Inovação tecnológica e preferência de consumo: Uma análise cross-Cultural Na américa latina", *Informação & Sociedade*, Vol. 22 No. 1, pp. 53-65.

Gill, T. (2008), "Convergent products: what functionalities add more value to the base?", *Journal of Marketing*, Vol. 72 No. 2, pp. 46-62.

Godin, S. (2009), *Purple Cow: Transform Your Business by Being Remarkable*, Portfolio, New York, NY.

Govindarajan, V., Kopalle, P.K. and Danneels, E. (2011), "The effects of mainstream and emerging customer orientations on radical and disruptive innovations", *Journal of Product Innovation Management*, Vol. 28 No. 1, pp. 121-132.

Han, J.K., Chung, S.W. and Sohn, Y.S. (2009), "Technology convergence: when do consumers prefer converged products to dedicated products?", *Journal of Marketing*, Vol. 73 No. 4, pp. 97-108.

Harris, J. and Blair, E.A. (2006), "Functional compatibility risk and consumer preference for product bundles", *Journal of the Academy of Marketing Science*, Vol. 34 No. 1, pp. 19-26.

Katz, J.E., Levin, M.L. and Hamilton, H. (1963), "Traditions of research on the diffusion of innovations", *American Sociological Review*, Vol. 28 No. 2, pp. 237-253.

Katz, J.E. and Sugiyama, S. (2006), "Mobile phones as fashion statements: evidence from student surveys in the US and Japan", *New Media and Society*, Vol. 8 No. 2, pp. 321-337.

Kim, Y., Lee, J. and Koh, D. (2005), "Effects of consumer preferences on the convergence of telecommunications devices", *Applied Economics*, Vol. 37 No. 7, pp. 817-826.

Kozinets, R.V. (1997), "I want to believe": a netnography of the X-Philes' Subculture of consumption", *Advances in Consumer Research*, Vol. 24, pp. 470-475.

Kozinets, R.V. (2002), "The field behind the screen: using netnography for marketing research in on-line communities", *Journal of Marketing Research*, Vol. 39 No. 1, pp. 61-72.

Kozinets, R.V. (2010), *Netnography: Doing Ethnographic Research Online*, Sage Publications, Toronto.

Kozinets, R.V., Patterson, A. and Ashman, R. (2017), "Networks of desire: how technology increases our passion to consume", *Journal of Consumer Research*, Vol. 43 No. 5, pp. 659-682.

Langer, R. and Beckman, S.C. (2005), "Sensitive research topics: netnography revisited", *Qualitative Market Research: An International Journal*, Vol. 8 No. 2, pp. 189-203.

Lee, S., Lee, J.H. and Garrett, T.C. (2013), "A study of the attitude toward convergent products: a focus on the consumer perception of functionalities", *Journal of Product Innovation Management*, Vol. 30 No. 1, pp. 123-135.

Lima, R.M.C. and Arruda Filho, E.J.M. (2012), "Preferências hedônicas e justificações utilitárias na introdução de novos produtos de alta tecnologia", *Journal of Information Systems and Technology Management*, Vol. 9 No. 1, pp. 171-188.

Mangalindan, J. and Wagner, K. (2012), "51 coolest gadgets of 2012", available at: http://money.cnn.com/gallery/technology/2012/12/26/cool-gadgets.fortune/ (accessed 25 May 2014).

Mann, S. (2013), "Wearable computing", in Friis, R., Toyoshima, K. (Eds), *The Encyclopedia of Human-Computer Interaction*, 2a ed., The Interaction Design Foundation, Aarhus, available at: www.interaction-design.org/encyclopedia/wearable_computing.html

Moore, G. (2014), *Crossing the Chasm: Marketing and Selling Technology Products to Mainstream Customers*, (3rd. ed.), HarperCollins, New York, NY.

Nunes, J.C. (2000), "A cognitive model of people's usage estimation", *Journal of Marketing Research*, Vol. 37 No. 4, pp. 397-409.

Nunes, P., Wilson, D. and Kambil, A. (2000), "The all-in-one market", *Harvard Business Review*, Vol. 3 No. 4, pp. 2-19.

Okada, E.M. (2005), "Justification effects on consumer choice of hedonic and utilitarian goods", *Journal of Marketing Research*, Vol. 42 No. 1, p. 43.

Park, C. (2006), "Hedonic and utilitarian values of mobile internet in Korea", *International Journal of Mobile Communications*, Vol. 4 No. 5, pp. 1-11.

Retondar, A. (2008), "A (re) construção do indivíduo: a sociedade de consumo como "contexto social" de produção de subjetividades", *Sociedade e Estado*, Vol. 23 No. 1, pp. 137-160.

Rogers, E.M. (2003), *Diffusion of Innovations*, (5a ed.), Free Press, Nova York, NY.

246

Said, M.F. and Adham, K.A. (2016), "Is a mobile phone a disruptive innovation in the workplace?", *Gadjah Mada International Journal of Business*, Vol. 18 No. 2.

Schumpeter, J.A. (1942), *Capitalism, Socialism and Democracy*, Harper & Brothers, New York, NY.

Slama, M.E. and Singley, R.B. (1996), "Self monitoring and value-expressive vs. utilitarian ad effectiveness: why the mixed findings?", *Journal of Current Issues & Research in Advertising*, Vol. 18 No. 2, p. 39.

Slater, D. (2002), *Cultura Do Consumo & Modernidade*, Nobel, São Paulo, SP.

Solomon, M.R. (2011), *Comportamento Do Consumidor: comprando, Possuindo e Sendo*, 9. ed., Bookman, Porto Alegre, RS.

Time (2012), "Best inventions of the year 2012", available at: http://techland.time.com/2012/11/01/best-inventions-of-the-year-2012/ (accessed 25 May 2014).

Veblen, T. (1899), *The Theory of the Leisure Class*, MacMillan, New York, NY.

Yaoyuneyong, G., Foster, J., Johnson, E. and Johnson, D. (2016), "Augmented reality marketing: Consumer preferences and attitudes toward hypermedia print ads", *Journal of Interactive Advertising*, Vol. 16 No. 1, pp. 16-30.

Further reading

Apple Inc (2014). "Q2 2014 unaudited summary data (Units in thousands, revenue in millions)", available at: http://images.apple.com/pr/pdf/q2fy14datasum.pdf

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