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MARKETING | RESEARCH ARTICLE

Consumer technology brands and the source of their performance

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Abstract: Over the past 20 years, consumer technology products have significantly impacted consumers' purchasing patterns and behaviors. The companies catering to this market have demonstrated unprecedented innovation and financial performance. Therefore, it is important to understand how consumers process such brands in forming their product preferences. Consumer technology brands comprise certain products—smartphones, tablets, smartwatches, music devices, and laptops—that fulfill a complex mix of numerous functional and emotional needs, such as joy, socialization, group acceptance, and group recognition. This study proposes a conceptual framework to explain how brand loyalty for such products is built upon certain relevant brand perceptions. In an empirical post hoc study involving 320 technology product customers, measurements for the constructs involved were established, and a multi-category approach was adopted wherein respondents evaluated Apple, HP, Samsung, and Sony products. A statistical structural model is presented wherein the relationships proposed in the hypotheses are tested and supported. It is established that brand perceptions of innovativeness, benefits, and identification are likely to be strong antecedents of brand loyalty. Unlike previous

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ABOUT THE AUTHOR

Jorge Vera-Martínez is a Research Professor in the Tecnológico de Monterrey Business School. He has taught, at graduate and undergraduate levels, subjects such as marketing research, brand management, and multivariate methods for marketing decisions. He has published several research articles on topics such as consumer behavior, service/product performance, consumer involvement, perceived value, brand perceptions, and marketing strategies. At the EGADE Business School, he is currently the leader-coordinator of the Research Group (GIEE) on Consumer Behavior and Conscious Marketing and a member of the faculty of the Ph.D. Program in Administrative Sciences. One of the research lines addressed by this research group is "branding and consumer perceptions". In this research line, studies address the effects of brand perceptions on customer behavior. Here, variables such as product/service performance, perceived value, consumer-brand identification, purchasing patterns, and brand performance are analyzed. Our studies emphasize responsible and sustainable use of brands and marketing strategies.

PUBLIC INTEREST STATEMENT

Consumer technology companies have experienced impressive growth. An analysis of these companies and products reveals that these brands share certain features that enable them to be named as consumer technology brands. These companies tend to implement a brand architecture strategy wherein they combine the use of a parent brand with sub-brands. These types of consumer technology brands offer products (laptops, tablets, smartphones, music devices, and gaming devices) that aim to fulfill a complex set of needs involving emotional aspects such as membership, recognition, and pleasure. Brands that share some of these characteristics are Apple, HP, Samsung, Sony, LG, Bose, Panasonic, and Logitech. This study proposes a framework to explain how brand loyalty for such products is built upon certain brand perceptions. When perceived innovativeness, benefits, and identification arise, consumers tend to manifest a high level of emotional commitment to these brands, thus reducing the probability of switching to another brand.

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literature, this study measures perceived benefits at the parent-brand level rather than at that of the product–category.

Subjects: Consumer Psychology; Marketing Research; Brand Management; Consumer Behaviour; Marketing Management; Relationship Marketing

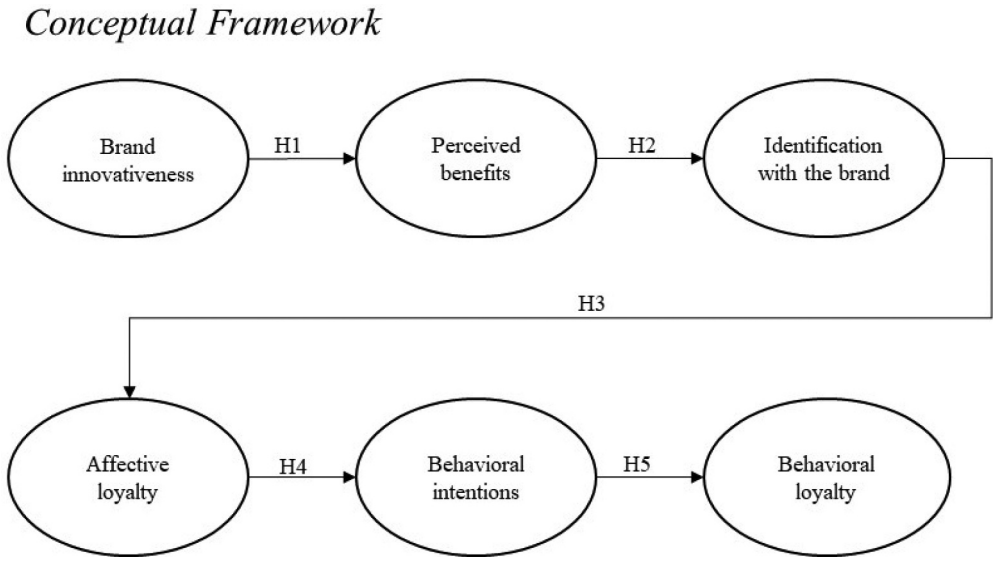
Keywords: brand innovativeness; perceived benefits; identification with the brand; affective loyalty; purchase intentions; behavioral loyalty; technology brands

1. Introduction

Over the past couple of decades, consumer technology companies have experienced impressive growth and financial performance. For example, in the United States, information technology services and online services are currently among the most profitable industries, followed by technology services and electronic technology products (Chen, 2015a, 2015b). Existing data indicate that Apple Inc. and Samsung Electronics are among the world's five most profitable companies (McIntyre & Frohlich, 2015). This study considers Apple, HP, Samsung and Sony to be prototypical examples of what is termed "technology brands" herein. An analysis of these companies and their products reveals that parent brands are likely to share certain features that enable them to be classified as technology brands. Further, two defining features are considered. First, to differentiate their products and establish their target market, these companies tend to implement a brand architecture strategy wherein they combine the use of a parent brand with a sub-brand (e.g., Apple iPhone, Samsung Galaxy, HP Pavilion, and Sony Walkman). Under this configuration, the parent brand is the one related to the firm as a whole, while the sub-brand is related to a particular product–category or line in the firm's portfolio (Aaker & Joachimsthaler, 2000). The second defining feature of these firms is observed to be a generic differentiation strategy. Under such a strategy, a firm seeks to offer high-quality products at a corresponding price while simultaneously trying to maintain a high level of product and line diversification to manage risks (Porter, 1980, p. 56). Such brands are likely to implement strategies targeting high-end markets and become world-renowned. Some of their sub-brands are likely to become famous as well (e.g., PlayStation, Envy, Galaxy, and iPad). A considerable portion of their business is focused on the final consumer product categories, with electronics being their core business. Thus, these brands tend to have salient positions in the Gartner's Digital IQ Index (*Consumer Electronics*, 2018) and other rankings of consumer electronics companies. Other brands that tend to share some of these characteristics are LG, Lenovo, Huawei, Bose, GoPro, Dell, Panasonic, and Logitech.

These types of consumer technology brands offer products (i.e., laptops, tablets, smartphones, music devices, and gaming devices) that are aimed at fulfilling a complex set of superior needs involving emotional aspects such as membership, recognition, and pleasure as well as the obvious functional benefits related to aspects such as productivity, communications, organization, and transactions. We believe that this combination of needs fulfillment implies a unique set of brand loyalty drivers that make technology brands quite different from others. Technology products are characterized by the wide range of needs to which they attend and by their intense rate of innovation, suggesting that branding strategies may be of greater importance for technology products than they are for packaged goods (Mohr et al., 2010, p. 408; Morris, 1996; Truong et al., 2017; Ward et al., 1999). A brand that has positive quality associations offers cues that enable the consumer to predict the quality of a product (Van Osselaer & Alba, 2000). Therefore, the success of this kind of brand appears more probable when a good fit exists between a brand's cognitive associations and a product's features; customers tend to respond favorably to a well-known brand when a new product involves complex technological features (Guo et al., 2018; Völckner & Sattler, 2006). Apparently, brands with such a fit help reduce the perceived risk of attempting something new.

Figure 1. Conceptual framework.



Evidence indicates that despite the profound differences between consumers who are early adopters and those who are late adopters, both tend to prefer well-known brands when new high-technology products or products with innovative technological features (such as smartphones and laptops) are launched (Truong et al., 2017).

This study offers a conceptual framework supported by certain hypotheses that attempt to explain the development of brand loyalty and the market performance of technology brands. This framework is based on the relationships between certain perceptual variables that we believe to be particularly relevant. This conceptual framework, described below, is illustrated in Figure 1. In the following sections, we present the conceptual framework, hypotheses, methodology for testing these claims, results, and discussion.

2. Conceptual framework

The product innovativeness of a firm has been defined as the degree of intensity with which it innovates in the market and the extent to which its products exhibit novel features (Story et al., 2015). Perceived innovativeness of technology brands is closely related to the tendency to add new features to products that are constantly being relaunched. It appears to be common for flagship products to be strategically employed to emphasize and engender the innovative nature and image of these kinds of brands as a way of promoting their lines of product categories (Hubert et al., 2017).

Innovative brands, such as the technology brands referenced in this study, tend to offer a large range of strategic benefits. For example, brand attitude has been shown to yield greater advertising effectiveness when innovative brands come into play; consumers seemingly tend to have a positive response to these kinds of brands when evaluating advertising efforts (Barone & Jewell, 2014). Moreover, it appears that innovative brands (with which consumers tend to be more forgiving) allow a higher level of advertising flexibility, such that advertisements that are backed up by these types of brands can effectively use a wider range of atypical advertising tactics in contrast with non-innovative brands (Barone & Jewell, 2014). Thus, Shams et al. (2015) propose "consumer perceived brand innovativeness" as a brand-level construct in contrast with previous approaches that treat perceived innovativeness exclusively at the product or firm level. After a thorough analysis, they describ it as a subjective evaluation of a brand related to the extent to which a brand is capable of offering novel, creative, attractive, and useful solutions to satisfy consumer needs.

Previous studies have suggested that perceived brand innovativeness is an antecedent of excitement about a brand, customer satisfaction and purchase intentions (Shams et al., 2015). It has been shown that there is an attractiveness associated with new and useful ways of addressing consumer needs, such that perceived brand innovativeness is likely to be a direct antecedent of consumer commitment to a brand (Eisingerich & Rubera, 2010). For a complex technological product, such as a car, perceived brand innovativeness can generate an increase in the level of consumer involvement with the product by attracting the customer's attention to the brand (Henard & Dacin, 2010). This attention can thus be seen as related to excitement about the product and the positive perception of it, encouraged by that particular brand's perceived innovativeness. Therefore, we will retain the following hypothesis:

H1: With technology brands, perceived innovativeness has a direct effect on perceived consumer benefits (perceived performance).

Customer-perceived benefits are understood herein as the extent to which the perceived performance of the attributes of the products of a certain brand meet the customers' needs and desires from their perspective. Customers appear to have a stronger positive attitude toward a brand when they believe that it has many favorable characteristics (Bandyopadhyay & Martell, 2007). For airline brands, evidence shows that memorable experiences and social benefits provided by the brand to the customer are likely to produce positive feelings toward the brand that can stimulate the formation of brand identification (So et al., 2017). Other benefits such as brand prestige and distinctiveness can be positive antecedents of the level of self-identification that a customer can build with a brand (So et al., 2017). Apparently, when consumers perceive that products of a particular brand can consistently meet their needs and make them feel that they have benefited from it, beliefs about that brand being closer to their scheme of needs can be triggered. These beliefs may thus promote feelings of ownership of the brand and emotional attachment to it when the gap between what the consumer needs and the level to which the brand achieves those needs can be reduced. Consequently, we consider the following hypothesis:

H2: With technology brands, perceived benefits have a direct effect on brand identification.

Identification with a brand, based on social identity theory (e.g., Stets & Burke, 2000), can be understood as an overlap, congruency, or fit between the consumers' self-concept (i.e., self-identity) and their perception of the brand's identity or image (Elbedweihy et al., 2016; So et al., 2017). This level of congruity can have a direct, sequential effect on different components of the brand loyalty construct by making the brand more appealing to the consumer (Nikhashemi & Valaei, 2018). Evidence indicates that consumer–brand identification, compared with other possible antecedents, can be a powerful explanatory variable for brand loyalty in different product categories, including consumer technology products such as laptops (Vera & Trujillo, 2017) and cell phones (Kim et al., 2001). Thus, the level of attractiveness of a brand and the level of identification (congruity) with that brand tend to be two closely related variables (Elbedweihy et al., 2016; So et al., 2017). Because of a high identification with a certain brand, consumers tend to manifest a high level of emotional commitment to that brand, thus reducing the probability of switching to another brand. For example, in a study about two technology product categories—mobile phones and televisions—it was found that consumers who closely identify with a preferred brand were not only loyal to the brand but also had a tendency to ignore, suppress, avoid, and withstand adverse information about it to which they were exposed (Elbedweihy et al., 2016). Additionally, measurements of the degree of consumer identification with a brand are indicative of brand attachment; thus, brand attachment is considered to be the strength of the emotional and cognitive bonding of a consumer to a brand (Park et al., 2010). For instance, in a study on smartphone users (Ghorbanzadeh et al., 2020), sentiments of attachment to a brand resulted in a powerful antecedent of affective brand loyalty (the level of emotional commitment to the brand). Hence, evidence suggests that the perceived congruence between self-image and brand image

(identification) encompasses a powerful emotional connection of the consumer with a brand. Furthermore, it has been proposed that smartphone brands have a unique identity for the consumer because of the level of personalization that these gadgets can have (e.g., ring tones, screensavers, backgrounds, and apps). Apparently, this level of customization tends to represent a group of attributes that is very important for customers of these types of products. Thus, a higher level of customization (an increase in perceived benefits) can enable a higher level of identification with the brand and therefore foster brand loyalty (Yeh et al., 2016). If smartphone brands are contained in what we refer to as technology brands, it would be sound to believe that they can share some of the characteristics of smartphone brands in terms of identification. In a study wherein respondents were asked to evaluate their favorite brands across several product categories, one being electronics, consumer–brand identification was also found to be a relevant factor in stimulating affectivity toward the brand (Tuškej et al., 2013). Therefore, in the present conceptual framework we include the following hypothesis:

H3: With technology brands, identification with the brand has a direct effect on affective loyalty.

The following aspects of this conceptual framework are based on the theory of brand loyalty formation through a series of stages or phases of loyalty proposed by Oliver (1999), which is in turn based on the theory of attitude components. According to Oliver (1999), cognitive (knowledge) aspects of a brand related to consumer consciousness can have a positive effect on the affectivity that a consumer may feel for a brand. If the information in the consumer's mind is favorable, then pleasant feelings toward the object (in this case the brand) may be triggered. Then, the favorable affective effect, along with the favorable cognitive content, tends to activate behavioral intentions (intention to purchase or conative loyalty) in the consumer. Finally, as an outcome of the previous mechanisms, the emergence of an actual repeated purchasing behavior toward the brand (behavioral loyalty) is probable. Therefore, the formation of cognitive components must be achieved before affective ones can be reached.

In the current conceptual framework (in an attempt to explain the formation of loyalty to consumer technology brands), we believe that the constructs outlined in the above-mentioned hypotheses (perceived innovativeness, perceived benefits, and identification with the brand) play the role of the cognitive components that must precede the formation of affective loyalty. It has been empirically confirmed that when cognitive and affective components of the perception of a technology product (in this case, the smartphone) correlate, these components serve as antecedents of consumer behavioral intentions (Lin et al., 2015). Therefore, we assume the following hypothesis:

H4: With technology brands, affective loyalty has a direct effect on behavioral intentions (cognitive loyalty).

Although the literature in general has revealed certain inconsistencies when establishing constructs to predict behavioral loyalty, the variable of behavioral intentions appears to be a highly consistent antecedent of behavioral loyalty (Bandyopadhyay & Martell, 2007). In the review of the brand loyalty literature, particularly the review of research articles on the measurement of behavioral intentions, it is noticeable that the latter concept is referenced under various names. For example, it can be found under terms such as purchase intentions, behavioral intention, intentional loyalty, conative loyalty, and attitudinal loyalty. Additionally, behavioral loyalty can be found in the literature under different terms such as repeat purchase pattern, action loyalty, and others. Some authors concur that true brand loyalty occurs when these two forms of loyalty can be observed together: a favorable disposition (affectivity) to a brand with a favorable pattern of repeat purchasing behavior (Bandyopadhyay & Martell, 2007; Park et al., 2010). According to Oliver (1999) (partially based on Kuhl & Beckmann, 1985, p. 90), the mechanism by which intention gives way to observable actions corresponds to a sequence that can be called the "action–control

paradigm." In this process, the intentional state can breed a cognitive "prepared-to-action" condition. Additionally, in this sequence, a desire to overcome obstacles that may discourage purchasing behavior also tends to emerge. If these two conditions occur, they may generate a strong motivation to purchase the product and, thereafter, if repeatedly reinforced, even to incentivize repurchase. As noted above, a study with users of a consumer technological product (the smartphone) confirmed the cascading effect of causalities between loyalty phases, thus suggesting that this theory can explain how brand loyalty is built up for technological products in general (Lin et al., 2015). A study involving users of a portable electronic device (the iPod) presents analogous results (Park et al., 2010). Therefore, we consider the following hypothesis:

H5: With technology brands, behavioral intentions have a direct effect on behavioral loyalty.

2.1. Expected indirect effects

These previously proposed hypotheses are related to the expected direct effects among the constructs proposed in the model to explain loyalty toward technology brands. However, as additional hypothesized elements in this conceptual model, indirect relationships appear to exist among these constructs. For example, as innovativeness serves as a signal to encourage consumer behavior, there is evidence suggesting that there are indirect effects (or some sort of relationship) of perceived innovativeness on components of brand loyalty (Anisimova, 2007; Eisingerich & Rubera, 2010; Fazal-e-Hasan et al., 2019; Henard & Dacin, 2010; Pappu & Quester, 2016; Shams et al., 2015, 2017). It has also been suggested that the perceived congruity between brand image/personality and the consumer's self-perception (identification with the brand) can have an indirect effect on the different phases of loyalty (Eisingerich & Rubera, 2010; Guido & Peluso, 2015; Kang et al., 2015; Nikhashemi & Valaei, 2018). Therefore, the effects of perceived innovativeness are expected to cause identification with the brand and aspects of loyalty. Accordingly, there are expected indirect effects of perceived benefits and brand identification on behavioral intentions and behavioral loyalty. Figure 3 illustrates a complete pattern of these indirect effects.

Overall, superior levels of product innovativeness tend to correspond to higher levels of financial performance of new products in firms with a high market orientation strategy (the type of strategy commonly followed by consumer technology brands), despite the high market risk that this combination implies (Story et al., 2015). This relationship could be explained by the bridging effect that brand loyalty can have between innovativeness and business performance, as suggested by the current framework.

3. Methodology and measurements

What do we mean by "technology brands?" For this study, we selected users of Apple, HP, Samsung, or Sony products, or any combination thereof. These brands were chosen because of the following characteristics. They are multiproduct brands at the corporate (parent) level that follow a multiproduct category strategy. These four are parent brands that use sub-brands for each of the product categories they offer (e.g., Apple Watch, HP Pavilion, Samsung Galaxy, and Sony Walkman). The four brands tend to conduct a part of their core business based on a business-to-consumer strategy (products are offered to final consumers). They are well-recognized brands at the global level. Furthermore, these four brands belong to companies that commonly follow a generic differentiation strategy that involves high-level differentiation and high-level diversification (differentiation strategy as in Porter, 1980, p. 56), and obviously, they offer electronic technological products.

To participate, the respondents had to have recently purchased at least one consumer product from one of the four participant brands (Apple, HP, Samsung and Sony) targeting final consumers: smartphones, tablets, personal computers, music devices, laptops, etc. (industrial products were not considered). The purchased product had to be for their own use (i.e., was not a present for someone else). They had to be familiar with this brand and its products. In the questionnaire,

respondents had to evaluate the particular brand. Participants were final consumers aged between 23 and 35 years. This age range was selected as it is a common segment for these brands' products and because it provides some control over the sample's variability. The final sample (n = 320) is fairly balanced thoughout this age range. The sample is also fairly balanced for gender, as 53% of the respondents identified as men and 47% as women. The sample is also equally divided among the four participating brands (25% each).

With these subjects, a post hoc design was implemented under which they had to answer a structured questionnaire comprising items related to the constructs proposed in the conceptual framework. The participants were chosen using convenience sampling by randomly approaching potential respondents; these were intercepted and asked to participate in the study. The full questionnaire was given once it was confirmed that the participants met the requirements. These encounters occurred on university campuses (the participants were not necessarily students). The questionnaire was pilot tested and corrected twice (n = 20 each) before the final version was distributed.

Perceived benefits are often assessed recognizing various dimensions of this construct. Common dimensions of perceived benefits are cognitive, social, personal, spiritual, and enjoyment benefits (e.g., Casidy, 2013; Mimouni-Chaabane & Volle, 2010; Mulyanegara, 2011; Wang et al., 2013). In some studies, perceived benefits are measured directly in terms of the perceived performance of a specific set of product/service-level attributes (e.g., Loureiro, 2013). Under another approach, perceived benefits have been suggested as a construct formed by three dimensions: functional, experiential, and symbolic benefits (e.g., Kang & Shin, 2016; Keller, 1993). All these visions are consistent with a product-level approach regarding specific attributes of a product or service category.

For the current study, as we are dealing with the perception of parent brands (as set forth above) which include multiple sub/product–category brands (conveying a great number of benefits, needs, or attributes), we needed a different perspective. Thus, we adopted a unidimensional overall procedure. Therefore, measurements were designed with which perceived benefits could be assessed at a parent brand level. In this fashion, these items are intended to reflect the level at which the customer perceives benefits without specifying any benefits or attributes in particular. However, this way of measuring is consistent with previous approaches in that perceived benefits must be related to the fulfillment of needs (in this case, unspecified needs). These items are presented in Table 1 along with measurements for the other constructs contemplated in this model, with references to the related literature. These other measurements were not extracted from one particular source; rather, they were adapted from various sources or written following the example of previous research. The aim throughout was to remain consistent with previous literature in order to maintain conceptual validity. Questionnaire items were associated with attitudinal scales ranging from "totally disagree" to "totally agree." In the case of brand innovativeness, perceived benefits and identification with the brand seven-point scales were used. In the case of affective loyalty and intentions, six-point scales were employed. Finally, for behavioral loyalty, a five-point scale was utilized. These variations in the scales were used as a way to reduce common method bias (Podsakoff et al., 2012). Other tactics used with the intention of reducing the potential effect of this phenomenon were related to the questionnaire format, such as page breaks, sectioning, visual changes, and resetting instructions (Podsakoff et al., 2012). Nevertheless, a Harman's single-factor test was performed. According to this technique, if common method bias exists, only one factor should emerge (with 50% or more of explained variance) from an exploratory factor analysis wherein all of the observed variables (items) for the constructs in the model are introduced (Podsakoff et al., 2003). This was not the case; actually, many factors emerged.

Three items for each construct (shown in Table 1) were tested for unidimensionality with a convergence validity test using factor analysis (principal components) with no rotation. If all

Table 1. Measurements

Items	Adapted from
Consumer perceived brand innovation This brand has highly trendy and relevant products. It is a brand with innovative products. This brand is at the forefront of its market.	Fazal-e-Hasan et al., 2019; Henard & Dacin, 2010; Pappu & Quester, 2016; Shams et al., 2015.
Perceived benefits of the brand Products with this brand are always highly useful or beneficial. With this brand, I always have products that go with my needs. The products of this brand have always been useful to me.	Author's elaboration.
Identification with the brand (self–brand congruity) This brand understands me as to what I need. I identify myself with this brand. This brand reflects the things that interest me.	Guido & Peluso, 2015; Kim et al., 2001; Rather, 2018; So et al., 2017; Tuškej et al., 2013; Vera & Trujillo, 2017; Wang et al., 2013.
Affective (attitudinal) loyalty to the brand I really like this brand. I prefer this brand over others. This brand is one of my favorites.	Bennett & Rundle-Thiele, 2002; Oliver, 1999; Tuškej et al., 2013; Yoo & Donthu, 2001.
Purchase intentions (intentional loyalty) I will buy this brand again. I will recommend this brand. I consider this brand first when I buy products of this type.	Kim et al., 2001; Yoo & Donthu, 2001; Zeithaml et al., 1996; Baumann et al., 2007; Rather, 2018.
Behavioral loyalty toward the brand I usually buy this brand. I have bought products of this brand. I have always selected this brand.	Oliver, 1999; Olsen, 2002; Martos-Partal & González-Benito, 2013; Vera & Trujillo, 2017.

The original items in Spanish are presented in Table A1.

items converged in a single factor with high factor loadings, they were considered unidimensional. In Table 2, the factor loadings and coefficients of the factor analyses are presented. Kaiser–Meyer–Olkin (KMO) and Bartlett's tests and average variance extracted (AVE) coefficients tend to confirm that the factor models are representative of the observed variables (items), thus confirming unidimensionality. Table 2 exhibits composite and Cronbach's alpha coefficients above .8 which support the items' high level of reliability (Tavakol & Dennick, 2011).

4. Results

The descriptive statistical results for the observed variables are presented in Table A2. To test the conceptual model and hypotheses, a statistical structural model (SEM) was designed using AMOS software with a maximum likelihood procedure. In this statistical model, all of the measurement weights between latent variables (for each construct) were statistically significant, confirming the results presented in Table 2. Regarding the absolute fit indices, a CMIN/DF coefficient of 3.64 and a root mean squared error of approximation (RMSEA) coefficient of .09 were obtained. The minimum discrepancy per degree of freedom (CMIN/DF) values under 5.0 tend to be an indicator of a good fit between the data and the model (Hooper et al., 2008; Wheaton et al., 1977). RMSEA coefficients below .1 tend to be acceptable (Browne & Cudeck, 1992; Hooper et al., 2008). Regarding relative (baseline) fit indices, the following outcomes were obtained: NFI = .90, IFI = .93, TLI = .92 and CFI = .93. According to some studies, for this type of fit index, values above .9 tend to be acceptable and indicate a good fit between the observed and the baseline models (Bentler & Bonett, 1980; Byrne, 2013; Hooper et al., 2008). Using multiple index presentation with combined rules of rejection/acceptance is one way to reduce the probability of making Type I or Type II errors when assessing model fit in structural equation modeling (Hu & Bentler, 1999).

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Table 2. Measurement's convergence validity and reliability coefficients

	Convergence				Reliability	
Variable (three items each)	**Item's single-factor loadings**	**KMO**	**Bartlett's test *p*-value**	**AVE**	**Composite reliability**	**Cronbach's alpha**
Perceived innovation	.83 .89 .86	.75	.000	.74	.90	.92
Perceived benefits	.86 .91 .87	.72	.000	.77	.91	.86
Identification with the brand	.82 .91 .89	.67	.000	.76	.91	.85
Affective loyalty	.87 .93 .92	.73	.000	.82	.93	.89
Purchase intentions	.92 .89 .90	.74	.000	.82	.93	.89
Behavioral loyalty	.86 .91 .88	.72	.000	.78	.91	.86

Table 3. Results

Hypothesis	**Relationship**			**Standardized coefficient**	***p*-value**	**R^2**	**Decision**
H1	Innovativeness	→	Benefits	.85	≤.001	.73	Supported
H2	Benefits	→	Identification	.87	≤.001	.75	Supported
H3	Identification	→	Affective	.84	≤.001	.70	Supported
H4	Affective	→	Intentions	.97	≤.001	.93	Supported
H5	Intentions	→	Behavior	.35	≤.001	.12	Supported

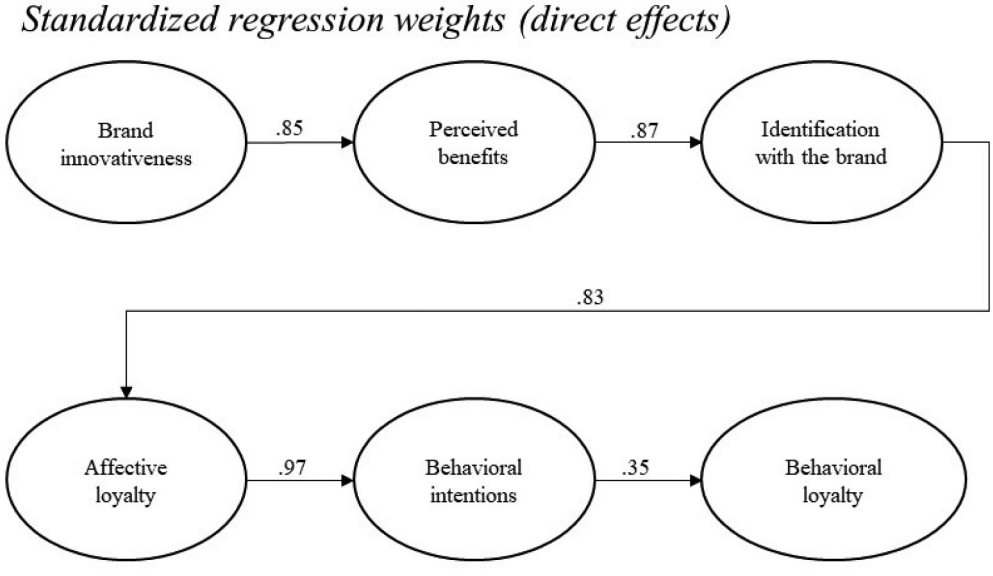

Figure 2. Standardized regression weights(direct effects).

All regression weights are significant at .05.

According to the information in Table 3 and Figure 2, the data tend to confirm the relationships proposed in the five hypotheses. In all cases, significant path coefficients are observed. Considerably high levels of explanation (R-squared coefficients) for dependent variables were obtained in the case of the first four hypotheses. Therefore, strong relationships were observed for H1–H4, supporting a considerable part of the theoretical model. However, although significant, coefficients for behavioral loyalty were lower than expected. As Oliver (1999) conjectured, of all of the loyalty phases, behavioral loyalty is expected to be the most difficult to predict and explain. The extant literature on brand loyalty tends to confirm this claim.

As presented in Figure 3, the expected indirect relationships between the constructs were obtained. To test for statistical significance regarding these indirect effects, a bootstrap confidence test was performed using multi-group analysis in AMOS. All of the relationships proved to be significant. Generally, strong indirect relationships were observed for the first five latent variables (constructs) in the model. Once again, the coefficients for behavioral loyalty were not very optimistic.

5. Discussion

5.1. Contributions

For the sake of parsimony, we have proposed a theoretical model based on current research with a minimum number of explanatory variables. However, we believe that other variables could be related to the current approach to technology brands in future research. The possible effects of some of these variables are outlined below. Nevertheless, out of curiosity, we have assessed the effect of variables such as customer satisfaction and functional perceived value (including items for these variables in the questionnaire) in this study. According to extant literature, these variables tend to have a relationship with the kinds of variables presented in the conceptual model; however, satisfaction and perceived value do not appear to be clearly related in loyalty studies of consumer technological products. We therefore tested the effect of customer satisfaction and functional perceived value on the statistical model. It appears that these two variables tend to

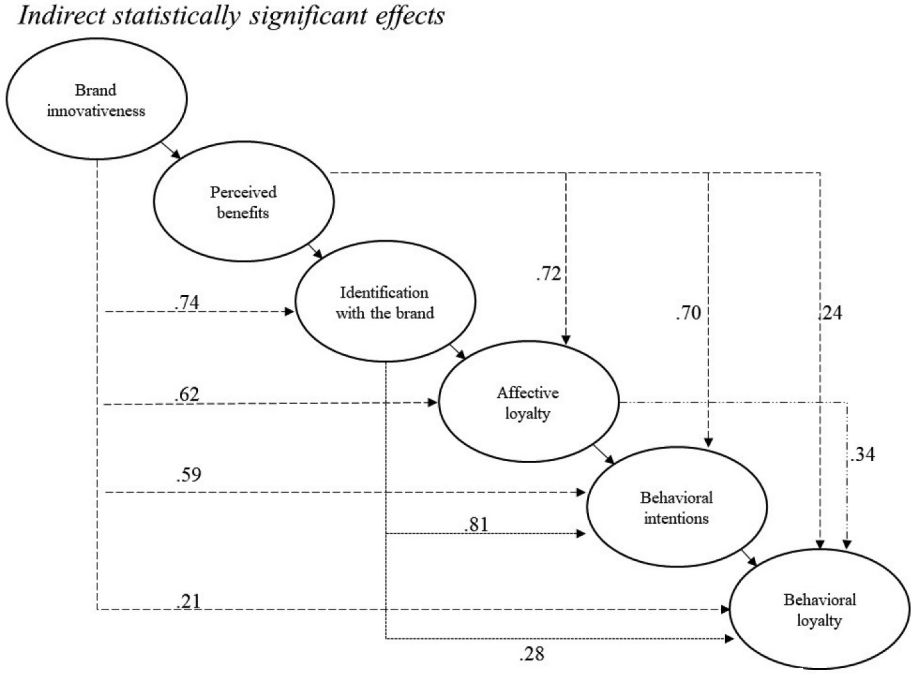

Figure 3. Indirect statistically significant effects.

Non-significant indirect effects over 0.01 were omitted from the figure (two tailed bootstrap confidence).

have a redundant role and statistical collinearity with perceived benefits in the model. When we tried to add them to the statistical model, rather than perceived benefits, the direct path coefficients, indirect coefficients, and the r-squared coefficients all tended to drop. Furthermore, the statistical models showed statistical fit problems with these attempts. Confirmatory evidence of this can be observed in Lin et al.'s (2015) study involving smartphone consumers. This study determined that satisfaction, although statistically significant, had a marginal relationship with affective loyalty and intentional loyalty, with coefficients of .23 and .32, respectively. These coefficients contrast sharply with the results in the current work; moreover, perceived benefits have indirect path coefficients of .72 and .70, respectively, with those same forms of brand loyalty (affective loyalty and intentional loyalty). Therefore, it makes more sense (conceptually and statistically) to include perceived benefits in the model and to exclude the other two variables (satisfaction and perceived value), at least under the conditions of the present study. Therefore, an important contribution of this study, aside from the model we have presented, could be the proposition and scale (items) used to measure perceived brand benefits at the parent brand level instead of the traditional measurements for this construct, which operate at a specific product attribute level, as explained above. This approach to perceived benefits, at an overall parent brand level, would be consistent with the complex mix of needs that these brands tend to address.

5.2. Limitations and future research

In the future, new variables could be related to the formation of brand loyalty in the context of consumer technology brands. For example, in a study conducted with some technological products, it was empirically supported that brand anthropomorphism (the level at which a brand is perceived to have human characteristics) can be an antecedent of the consumer's identification with the brand (Guido & Peluso, 2015). Thus, considering that brand identification has been proposed as an antecedent of brand loyalty here, if consumers feel that a brand has human features, then it should be easier for them to relate to that brand, thus reinforcing a level of self-congruency.

Another variable that could enrich the explanation of brand loyalty formation in the current context of technology brands is word of mouth (WoM). Accordingly, consumer–brand identification and affectivity for a brand have been corroborated as antecedents of WoM; the latter has also been treated as a precursor of behavioral intentions in the context of technological products (Kim et al., 2001; Tuškej et al., 2013). We believe that WoM and therefore e-WoM could be a relevant explanatory variable as it was noticed during the study that the participants liked to talk about (and hear about) the kind of products under the umbrella of these consumer technology brands.

In some cases, the level of a consumer's identification (congruity) with a brand's image can be an antecedent of brand trust; therefore, the latter can be a precursor of brand loyalty (Rather, 2018; So et al., 2013). Thus, it would be sound to believe that in consumer technological products, the level of trust in a brand can also have an effect on consumer loyalty. As the current type of products tend to be costly, trust in the brand is expected to be effective in reducing the inherent perceived risk.

An important limitation of this study is to be found in the way behavioral loyalty was measured. As noted in the methodology, this variable was operationalized as a self-reported behavior. Although a multi-indicator approach was adopted to increase the measurement validity of this latent variable in the statistical model, it appears preferable to measure indicators of behavioral loyalty as directly observable variables. Evidence shows that multi-item measurements outperform single-item measurements in terms of validity and reliability (Diamantopoulos et al., 2012). We know that when using indirect measurement of actual behavior, there is always the problem of self-image bias. However, there is evidence showing that self-reported behavioral measurements, although controversial (Kormos & Gifford, 2014), tend to correlate in many cases with directly observed indicators, showing concurrent validity (e.g., Morisky et al., 2002, 1986).

5.3. Practical implications

According to the study results, when managing consumer technological products, perceived innovativeness, perceived benefits, and consumer identification (self-congruency) with those benefits appear to be key elements to consider when designing marketing and branding strategies with the purpose of increasing consumer affectivity and willingness toward the brand. This aspect would mean that having technologically innovative attributes in a product would not be enough if there were no way to translate those innovative features into specific benefits that make a customer feel engaged with the brand at a personal, self-congruence level. These remarks are not directed to brands such as Apple, HP, Samsung, or Sony, as they already are implementing these kinds of strategies. These elements (innovativeness, benefits, and personal self-involvement) are noticeable in their advertising content. Rather, we are addressing a large number of entrepreneurial endeavors seeking to launch this kind of product (consumer technology products) into the market, as they may not have the skills and knowledge needed to build up their commercial names as those big brands have done. Another practical implication of the study would be that of all the possible new features that could be considered innovative in a technological product, only those features that can be translated to relevant, personal, and self-congruent benefits are likely to be features upon which strong brands might be created.

Furthermore, not only is it important for shaping branding strategies to choose relevant attributes that are translatable to self-image engaging benefits, but it is also important to know how to design communication content reflecting this essential attribute. This content should show how the novel features of the product can improve the fulfillment of the consumer's specific needs and wants.

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This work follows Tecnológico de Monterrey's Ethics Committee guidelines. Ethical principles of research with human beings have been considered and adhered to thoughout the performance of this study. Proper consent was verified when human subjects were invited to participate. All participants were above legal age of adulthood according to Mexican law.

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Appendices

Table A1. Original items in Spanish
Innovación percibida
Esta marca tiene productos muy actuales
Es una marca con productos novedosos
Esta marca está a la vanguardia
Beneficio percibido
Los productos con esta marca siempre son muy útiles o beneficiosos
Con esta marca siempre tengo productos que van con mis necesidades
Los productos de esta marca siempre me sirven
Identificación con la marca
Esta marca me entiende en cuanto a lo que necesito
Con esta marca me identifico
Esta marca refleja cosas que me interesan
Lealtad afectiva
Me gusta mucho esta marca
Prefiero esta marca que las demás
Esta marca es una de mis preferidas
Lealtad intencional
La próxima vez voy a volver a comprar esta marca
Recomendaría esta marca
Considero esta marca mi primera cuando compro productos de este tipo
Lealtad conductual
Generalmente compro esta marca
Las veces anteriores que compré productos relacionados, elegí esta marca
En el pasado siempre he elegido esta marca

Table A2. Descriptive results

	Sony		Samsung		HP		Apple	
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ
Innovativeness1	5.74	1.27	5.94	1.39	5.20	1.62	6.56	.69
Innovativeness2	5.51	1.23	5,76	1.47	4.79	1.72	6.53	.71
Innovativeness3	5.51	1.23	5.85	1.43	4.94	1.6	6.45	.78
Benefits1	5.58	.91	5.65	1.29	5.28	1.30	6.05	1.14
Benefits2	5.40	1.04	5.56	1.28	4.91	1.34	6.16	1.15
Benefits3	5.66	1.07	5.69	1.30	5.16	1.51	6.20	.95
Identification1	5.38	1.05	5.36	1.07	5.15	1.34	6.00	.98
Identification2	5.08	1.27	5.19	1.47	4.64	1.49	5.75	1.45
Identification3	5.38	1.27	5.53	1.22	4.80	1.66	6.06	.95
Affective1	4.69	.85	5.00	1.07	4.49	.98	5.49	.64
Affective2	4.38	1.17	4.39	1.11	3.95	1.43	5.30	1.14
Affective3	4.30	1.12	4.60	1.05	4.26	1.41	5.36	1.03
Intentions1	4.63	1.01	4.63	1.06	4.04	1.44	5.38	.99
Intentions2	4.96	.79	4.99	.95	4.44	1.24	5.41	.72
Intentions3	4.35	1.14	4.49	1.09	4.08	1.11	5.28	1.19
Behavioral1	3.63	.88	3.20	1.04	3.28	1.07	3.99	1.08
Behavioral2	3.65	.89	3.00	1.20	3.44	1.05	3.49	1.34
Behavioral3	3.15	1.21	2.58	1.23	2.99	1.16	3.05	1.36

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