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Design innovation and purchase behavior for augmented products

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ABSTRACT

Augmented products deliver functional and affective value above and beyond core and expected products, and, in turn, help companies differentiate themselves from competitors and improve market performance. However, there is little to no research on augmented products and their impact on market outcomes. In this study, we focus on augmented products and aim to answer whether design innovation plays a role in their purchase. Specifically, we examine the links from design innovation to perceived value and purchase intention, and then investigate the difference in these links across consumer groups. The empirical findings show that design innovation helps improve perceived value, which also leads to greater purchase intention. However, there are substantial differences in these relationships across groups of consumers, especially between the group called frugal rationalists and the other groups who value hedonic design aspects. Finally, we discuss augmented products as a vehicle to advance related theories and improve managerial insights.

1. Introduction

Design innovation plays a key role in determining product success and prior research has demonstrated its substantial impact by using a variety of products ranging from core to expected ones (Homburg, Schwemmler, & Kuehnl, 2015; Landwehr, Wentzel, & Herrmann, 2013). We contribute to this stream of research by studying augmented products. Augmentation adds value to core and expected products, making these products more attractive (Kotler & Keller, 2011), which, in turn, helps create competitive advantages and improve sales performance (Raval & Grönroos, 1996; Storey & Easingwood, 1998). In fact, the stand-alone market for augmented products is already sizable today and is expected to grow continuously. For instance, sales of mobile accessories reached \$81.5 billion globally in 2015, and are expected to grow to \$101 billion in 2020, according to ABI Research (2015). The size of this market is surprisingly large when compared with Samsung Electronics' revenues of \$170 billion in 2015. Thus, we focus on augmented products and study the effect of design innovation in purchasing them.

Related literature shows that consumers are likely to pay more attention to products with innovative designs, form more positive attitudes toward them, and engage in more favorable product behavior (Di Benedetto, 2012; Moon, Miller, & Kim, 2013). Design innovation consists of aesthetics, features, and emotional or symbolic aspects, and serves as the antecedent of perceived value that, in turn, determines purchasing behavior (Homburg et al., 2015; Moon et al., 2013). In fact, prior research on this topic centers on core and expected products while

leaving augmented products under studied. Thus, we investigate the relationships among design innovation, perceived value, and purchase intention for augmented products. Notably, varied purchase and usage experiences can create different evaluations of the same product, leading to different perceived value (Babin, Darden, & Griffin, 1994). This implies that the relationships mentioned above can substantially vary by consumer or consumer groups. Thus, we propose a series of hypotheses to understand not only the overall relationships but also the consumer group specific differences.

To this end, we choose a research setting where augmented products are widely adopted and repeatedly used. Game items purchased within online or mobile games are not only ideal for testing our hypotheses but also meaningful in other aspects. First, the worldwide market in the game industry was \$99.6 billion in 2016 and is expected to increase to \$118.6 billion in 2020 (Newzoo, 2016). Second, game companies sell various game items and accordingly, the market for game items is expanding rapidly among paying gamers who want to improve their performance and enjoyment (Park & Lee, 2011). These game items work as augmented products by providing additional value beyond the core benefits of enjoyment and stress relief (Bae, Koo, & Mattila, 2016). Third, we choose one of the most popular games, called League of Legend (LOL) as the focal game, and its items, called skins, as the focal augmented product. The focal game has gained widespread popularity all over the world since its release, and purchased game items are widely used by gamers (Guo & Barnes, 2009); this then helps generalize our findings beyond this focal game and its items.

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We conduct qualitative and quantitative studies to gain insights into purchasing behavior regarding augmented products and to understand the relationships among design innovation, perceived value, and purchase intention. Our empirical analyses and the corresponding interpretations indicate that innovative design attributes improve perceived value, and perceived value leads to purchase intention of augmented products. Moreover, the relationships among these are different for different groups of consumers in accordance with their prior purchasing behaviors. This group-by-group difference warns against uniformly applying the empirical findings to every gamer and thereby ignoring differences in their purchasing behaviors.

The rest of the paper is organized as follows. First, we discuss related literature and propose our hypotheses. We then introduce our research method based on qualitative and quantitative approaches. Next, we present the results from the hypotheses tests and our interpretations. Finally, we conclude with the empirical findings, discuss our contributions, and suggest avenues for future research.

2. Related literature

We begin by providing illustrative examples of augmented products. After describing the theory of planned behavior, we then discuss design innovation, perceived value, and purchase intention to predict their relationships in the context of augmented products.

2.1. Augmented products

Product values fall into four classifications: (1) the fundamental value of core products, (2) consumer expectations regarding quality and services, (3) augmentations that enhance products, and (4) potential quality that products would offer (Kotler & Keller, 2011; Levitt, 1983). Core products reflect essential value, whereas consumer expectation relates to feelings or the sense of the environments in which products are consumed and used. As such, in purchasing products, consumers usually anticipate values emanating from core and expected products such as repair equipment in good condition and accurately shipped packages. Augmentations offer additional benefits including well-made videos to teach consumers how to use repair equipment or text messages to notify consumers of the delivery of their packages. Augmentation can be a feature of either a core product or its extended form. In some cases, augmented products center on core products. That is, companies provide inexpensive or free products and then charge for add-ons. Online and mobile game companies, for example, offer games (core products) free of charge and then sell game items (augmented products) to generate revenue. In contrast, some products are line extensions. For instance, smartphone (core products) companies, such as Apple and Samsung, make accessories (augmented products) for their smartphones.

Augmented products deliver additional functional and affective values to consumers and add to growing sales for companies. Augmentation helps companies differentiate from others offering the same core and expected products. That is, augmented products can produce competitive advantages by improving perceived value and by shaping positive company-consumer interactions and relationships (Raval & Grönroos, 1996; Storey & Easingwood, 1998). Despite the potential to advance related literature and create market opportunities, there is limited research on augmented products, and thus, we aim to contribute by studying them here. Specifically, we study what role design innovation plays in the context of augmented products and how it leads to perceived value and purchase intention using the theory of planned behavior.

2.2. The theory of planned behavior

The theory of planned behavior has been widely used in social psychology and marketing to predict consumer behavior ever since

Ajzen (1985) proposed it. The theory of planned behavior is built on the theory of reasoned action that states that attitudes, subjective norms, intentions, and behaviors are inter-related (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). However, the theory of reasoned action is of limited use in predicting behavioral intention, and thus, the theory of planned behavior supplements it using perceived behavioral controls (Ajzen & Madden, 1986). Moreover, the theory of planned behavior allows additional variables to enrich the explanations of each construct (Conner & Armitage, 1998). As such, many previous studies use this theory to explain consumer behavior such as e-commerce adoption, switching intentions and behaviors, and travel-mode choices (Bamberg, Ajzen, & Schmidt, 2003; Bansal & Taylor, 2002; Pavlou & Fygenon, 2006). In our study, design innovation serves as a driver to explain consumer attitudes or perceived value and behavioral intention. Thus, taking the theory of planned behavior as our foundation, we look at the design innovation, perceived value, and purchase intention of augmented products.

2.3. Design innovation

Innovation in marketing usually means new products that stand apart from others through research and development (Cadwallader, Jarvis, Bitner, & Ostrom, 2010). In terms of product design, consumers derive tangible and intangible values from innovatively designed products, enabling design-driven innovation to generate new product meaning and increase product attractiveness (Di Benedetto, 2012) in terms of aesthetical, functional, and symbolic or emotional dimensions (Homburg et al., 2015; Moon et al., 2013). Aesthetics include attributes of appearance and beauty as perceived by consumers (Homburg et al., 2015). Features reflect perception of functional performance of the products being used (Moon et al., 2013). Emotion enhances positive evaluation of the functional features (Huang, Chen, Wang, & Khoo, 2014). Aesthetics, features, and emotion together help to differentiate one product from another in a similar condition and induce consumers to form positive attitudes toward the product and drive purchase decisions (Creusen & Schoormans, 2005).

Marketing scholars and practitioners focus on innovative design aspects that enhance consumer preferences and evaluations and provide a competitive advantage (Hoegg & Alba, 2011). Unsurprisingly, people prefer innovative rather than general designs and many companies are keen on design-driven innovation, starting at the initial stage of product development (Noble & Kumar, 2010). Prior work has examined core and expected products ranging from items such as automobiles to mobile phones (Homburg et al., 2015; Landwehr et al., 2013; Moon et al., 2013). However, research on augmented products has been relatively limited, especially for non-physical goods, and we aim to fill this gap. Thus, we examine aesthetics, features, and emotion as design innovation dimensions in the context of augmented products.

2.4. Perceived value and purchase intention

Prior research has highlighted that consumers purchase products according to perceived value. The perceived value of a product is manifest in its intrinsic and extrinsic product attributes and their benefits (Sheth, Newman, & Gross, 1991); individuals consider both hedonic and utilitarian values when they form attitudes about products and make product choices (Im, Bhat, & Lee, 2015). Products empirically studied have included cigarettes, luxury goods, and online game items; the findings indicate that perceived value, in general, is determined by financial, social, and functional value (Park & Lee, 2011; Sheth et al., 1991; Wiedmann, Hennings, & Siebels, 2009).

Following the stream of prior studies, we use perceived value from visual authority, monetary worth, mutual relationship, and self-expression as the key elements driving the purchase intention of augmented products. Specifically, visual authority indicates the product's functional value as a tool that represents the consumer's superiority

(Wiedmann et al., 2009). Monetary worth or cost effectiveness is a well-known value that leads to purchase decisions (Zeithaml, 1988). Mutual relationship is the relationship between the consumer and a brand (a company or product) and one of the antecedents of consumer equity that affects sales performance (Rust, Lemon, & Zeithaml, 2004). Self-expression represents the congruity between self-image and the product and reflects the fact that consumers purchase products that are aligned with their self-images (Kim & Drolet, 2003).

As mentioned earlier, an augmented product provides an added benefit to consumers already utilizing core and expected products. Prior research has investigated the effects of attitude on behavioral intention under the condition of product choice and brand switching, examining core or expected products (Bamberg et al., 2003; Bansal & Taylor, 2002; Pavlou & Fygenon, 2006). Accordingly, it will be worthwhile to investigate whether each component of perceived value succeeds in leading to purchase intention in the context of augmented products.

3. Hypotheses development

We propose hypotheses to understand the relationships among design innovation, perceived value, and purchase intention in the context of augmented products. We then further hypothesize that these relationships can vary across consumers based on different prior purchase experience. Fig. 1 presents the research framework.

3.1. Design innovation and perceived value

Aesthetics, features, and emotion have been well studied as dimensions of design innovation by using core and expected products (Homburg et al., 2015; Landwehr et al., 2013; Moon et al., 2013). Moreover, innovatively designed products have been shown to likely benefit from greater perceived value from visual authority, monetary worth, mutual relationship, and self-expression, again, by analysing core and expected products (Creusen & Schoormans, 2005; Park & Lee, 2011; Zhang et al., 2010). Augmented products share the same design innovation dimensions as core and expected products, and moreover, consumers of augmented products are more likely to depend on design innovation when forming product attitudes. As such, we investigate design innovation and perceived value in the context of augmented products and hypothesize a positive relationship between these. To this end, we posit that the dimensions related to design innovation include aesthetics, features, and emotion, and perceived value is determined by

visual authority, monetary worth, mutual relationship, and self-expression in the augmented product context. Thus, our first hypothesis is as follows:

H1. The design innovation of an augmented product will positively affect its perceived value.

3.2. Perceived value and purchase intention

The perceived value of products positively influences behavioral intention, and prior research confirms this link by examining core and expected products (Aaker & Jacobson, 2001; Kuo, Wu, & Deng, 2009). Augmented products are designed to improve an individual's experience, satisfaction, and purchase behavior, among other responses, and thus, we conjecture that the perceived value of augmented products will lead to purchase intention, and possibly, to a greater extent, compared to core and expected products. If the augmented products enhance visual authority in terms of consumer superiority, strengthen the consumer and company relationship, and are well aligned with the consumer self-image while being cost effective, they will positively impact purchase intentions. That is, we posit that the relationship between perceived value and purchase intention for an augmented product is at least as strong as that for core and expected products. Therefore, we hypothesize the following:

H2. The perceived value of an augmented product will positively affect purchase intention.

3.3. Consumer groups by purchase experience

Consumers evaluate design innovation, perceive product value, and determine purchase intention based on prior experience and product knowledge. This suggests that those with different prior experiences and product knowledge will link these three constructs in different varying degrees (Bamberg et al., 2003; Conner & Armitage, 1998). Accordingly, some researchers, like Wiedmann et al. (2009), classify consumers of luxury brands into materialists, rational functionalists, extravagant prestige-seekers, and introvert hedonists based on their purchase behavior. As such, we postulate that groups of consumers will present substantial differences in the relationships among design innovation, perceived value, and purchase intention. In the context of augmented products, consumers can be grouped based on prior purchase experience, especially when current and past circumstances are similar (Bamberg et al., 2003; Luo, Andrews, Song, & Aspara, 2014). Not everyone is likely to pay an additional fee for an augmented product. Therefore, we formalize our third and fourth hypotheses as follows:

H3. Consumers who differ in their purchase experience of augmented products will have different responses to the relationship between design innovation and perceived value.

H4. Consumers who differ in their purchase experience of augmented products will have different responses to the relationship between perceived value and purchase intention.

4. Research methods

In this study, we focus on League of Legends (LOL), one of the most popular online role-playing games, for the following reasons. First, LOL and its gamers can represent the overall online game industry due to its popularity worldwide. In a game release in November 2011, LOL accumulated 32.5 million players and 11.5 million active players. Subsequently, the numbers of active players continued to rise, reaching 32 million in October 2013 and then 67 million in January 2014 (Forbes, 2014). Despite the size of the online game industry and its

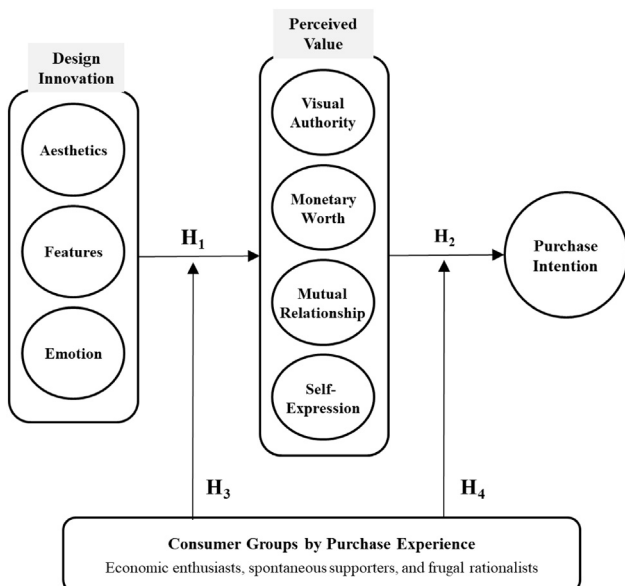


Fig. 1. Research framework.

potential for theoretical advancement and practical impact, somewhat surprisingly, the game industry has received little attention from marketing academia.

Second, LOL offers a research context in which core and augmented products are available. The core benefits of playing such games are enjoyment and stress relief (Bae et al., 2016). In this context, the core products are the games that players select and the characters they create; the expected products include accompanying features that enhance enjoyment such as real-time chatting with other gamers. Game items, usually paid for, help gamers embellish the characters they choose and create a further attachment to the game, over and above the gamer's expectation; thus, these work as augmented products (Park & Lee, 2011).

Third, LOL itself is available for free; however, gamers are allowed to purchase augmented products or game items called skins, which are designed to change a character's appearance without affecting gaming performance. In other words, skins provide little practical advantage to a player; this then helps avoid any confounding effect to improve gaming performance caused by such purchases (Kim, Kim, & Lee, 2016).

4.1. Focus group interviews

We conducted focus group interviews to qualitatively evaluate the proposed research framework. The interviewees included 25 participants aged 18 to 25 years old; about 70% of the participants had purchased skins for their champions in LOL.¹ After an introduction and explanations of the research objectives, the moderator detailed the interview procedure and asked questions about attitudes regarding the augmented products and reasons for purchasing them. The focus group interviews provide key insights as follows.

In line with prior research that shows that products are evaluated based on aesthetical, functional, and emotional dimensions (Homburg et al., 2015), our focus group confirms that the same dimensions operate when judging the design innovation of augmented products. That is, the elements constituting design innovation include aesthetics, features, and emotion.

We then move on the perceived value in purchasing augmented products and obtained construct-level components. First, skins help gamers acquire *visual authority*. The purchase of game items in a virtual world is similar to the purchase of luxury items or limited goods in a physical world. Skins allow gamers to satisfy intrinsic needs to enhance their image and appearance in the online gaming environment (Kim, Kim, & Mattila, 2012). Second, players take *monetary worth* into account when purchasing game items (Miller, Yan, Jankovska, & Hensely, 2017; Park & Lee, 2011). As the game itself does not require augmented products, game items should be cost-effective enough to induce gamers to purchase them. (Their prices range from \$4 to \$25, and are usually purchased during promotional events at discounted rates.)

Third, such purchases establish a *mutual relationship* between the gamer and the company that makes the game. This gamer-company relationship not only shapes the brand effect, trust, loyalty, and love (Carroll & Ahuvia, 2006; Chaudhuri & Holbrook, 2001), but also plays a role as an antecedent of consumer equity, as some gamers purchase skins to financially support the company (Rust et al., 2004). Fourth, skins serve as a means of *self-expression*, as the purchase of products and services represent the consumer's actual self as well as his/her ideal self (Malär, Krohmer, Hoyer, & Nyffenegger, 2011). This suggests that consumers are inclined to choose goods that correlate with their self-images to signal their identities to others. Fifth, notably, innovative skins, called legendary skins, are quite expensive, over \$14, and enhance perceived value even further. Legendary skins not only have innovative designs to change a character's entire appearance, including clothes and weapons, but also provide additional effects using motion,

sound, and particles.

Finally, we assess the relationships among design innovation, perceived value, and purchase intention. The interviews helped us understand not only how design innovation affects the perceived value of augmented products but also how individual beliefs and evaluations of the products (here, perceived value of skins) shape behavioral attitudes (i.e. repurchase intention of skins). These relationships support the theory of planned behavior as a foundation to account for purchase behavior of augmented products.

4.2. Measurement and survey data

The elements of design innovation include aesthetics, features, and emotion as already discussed, and the corresponding survey items we use are adapted from Moon, Park, and Kim (2015) and Moon et al. (2013). The focus group interviews confirmed that perceived value consists of visual authority, monetary worth, mutual relationship, and self-expression. Specifically, visual authority captures the fact that the augmented products appear to be expensive, as luxury goods, or valuable, as limited editions, which, in turn, leads to their perceived superiority. Monetary worth is associated with the cost-effectiveness of the augmented products. Mutual relationship and self-expression measure the consumer-company symbiosis and the congruity between self-image and the augmented products, respectively. We utilize the items in Park and Lee (2011) and Wiedmann et al. (2009) to measure the four elements of perceived value. Finally, purchase intention measures the willingness to purchase augmented products in the future. All the items are measured using seven-point Likert scales.

We collected data via online and field surveys in South Korea. In April and June 2015, we distributed 500 field surveys, with 401 responses, and received 168 online surveys from the most popular online game community. Respondents reported their past purchases of augmented products, and answered questions regarding design innovation, perceived value, and purchase intention. A total of 211 participants were omitted, including 194 with no prior purchase experience, and 17 as outliers, and thus, the responses of 358 participants were analysed. Table 1 shows summary statistics. They were 25 years old or younger and experienced with many years playing LOL. Among the respondents, 199 had purchased expensive (legendary) skins and 256 had purchased skins on sale, paying, on average, \$7.5 per skin.

5. Empirical results

We classify survey participants into groups based on their purchase experiences. We then test our hypotheses using pooled and group-specific data followed by multi-group hypothesis tests.

5.1. Consumer groups by purchase behavior

We discover the consumer groups based on the following purchase information: purchases during specific sales periods, purchases of expensive skins, purchase price range, and purchase frequency. We perform a two-step cluster analysis (Rundle-Thiele, Kubacki, Tkaczynski, & Parkinson, 2015), and the log-likelihood and BIC suggest the following three clusters or groups.

- *Group 1: economic enthusiasts*
This group of 139 participants represents economic enthusiasts who purchased expensive augmented products frequently and developed longstanding, high-level relationships with the company. Interestingly, they tend to purchase augmented products at various prices during a sales period.
- *Group 2: spontaneous supporters*
This group of 102 participants represents those who made spontaneous and random purchases of augmented products over a wide range of prices. Their purchase frequency and relationships with the

¹ Details about participants' characteristics are available upon request.

Table 1
Summary statistics of survey participants.

Variables	Pooled data	Consumer groups			
		Economic enthusiasts	Spontaneous supporters	Frugal rationalists	
Purchase of expensive skins	Yes	199	139	60	0
	No	159	0	42	117
Purchase during sales period	Yes	256	139	0	117
	No	102	0	102	0
Price range of skins	520 RP (\$4)	40	10	5	25
	750 RP (\$5.78)	51	16	11	24
	975 RP (\$7.50)	205	77	66	62
	1320 RP (\$10.40) or more	62	36	20	6
Purchase frequency	Every one month	54	32	20	2
	Every three months	130	53	36	41
	Every six months	81	30	16	35
	Every 12 months	93	24	30	39
Experience playing LOL (unit: years)	1 or less	20	8	4	8
	1 to 2	79	19	27	33
	2 to 3	141	51	43	47
	3 to 4	80	39	19	22
	4 or more	38	22	9	7
Game level	Bronze	40	9	14	17
	Silver	103	42	22	39
	Gold	104	32	36	36
	Platinum	66	36	13	17
Daily gaming time (unit: hours)	Over diamond	29	20	1	8
	1 or less	44	26	1	17
	1 to 2	137	47	44	46
	2 to 4	134	48	36	50
Weekly gaming time (unit: days)	4 or more	27	18	5	4
	1	49	15	16	18
	2	85	38	22	25
	3	91	32	21	38
	4	62	26	19	17
Gender	5 to 7	71	28	24	19
	Men	345	135	95	115
	Women	13	4	7	2
Age (unit: years old)	19 or less	91	36	27	28
	20 to 24	216	78	59	79
	25 to 29	45	23	13	9
	30 or more	6	2	3	1
Education	High school graduates	26	7	13	6
	University students	321	129	87	105
	University graduates	11	3	2	6

company are rather unclear.

• *Group 3: frugal rationalists*

The group of 117 participants represents those who purchased relatively low-priced augmented products during a sales period. Their relationship with the company has generally been for more than two years, at the middle level, and their playtime per day has been brief.

We perform confirmatory factor analyses using pooled and group-specific data, and obtain the battery of the items as designed to measure each construct.² Table 2 shows the descriptive statistics of the constructs for the pooled data and across groups. Further details of reliability measures and descriptive statistics are available in the online Appendix.

5.2. Group-specific hypotheses tests

Table 3 shows the group-specific results along with the results of the

² The confirmatory factor analyses are conducted using all variables to examine invariance of all samples. The goodness-of-fit statistics of the unconstrained model show that the model is consistent with the data; Pooled: $\chi^2_{(181)} = 428.320$ ($p < 0.001$), IFI = 0.954, CFI = 0.953, TLI = 0.940, RMSEA = 0.062; Group 1: $\chi^2_{(181)} = 370.052$ ($p < 0.001$), IFI = 0.909, CFI = 0.907, TLI = 0.882, RMSEA = 0.087; Group 2: $\chi^2_{(181)} = 342.757$ ($p < 0.001$), IFI = 0.903, CFI = 0.900, TLI = 0.872, RMSEA = 0.094; Group 3: $\chi^2_{(181)} = 262.175$ ($p < 0.001$), IFI = 0.957, CFI = 0.956, TLI = 0.944, RMSEA = 0.062.

pooled model. We interpret the group-specific results of the hypotheses tests after examining the pooled model.

5.2.1. Pooled (unconstrained) model

All three elements of design innovation positively influence the four components of perceived value, except for between features and visual authority, and between emotion and mutual relationship. To be specific, aesthetics positively affects all four elements of perceived value: visual authority ($\beta = 0.379$, $p < 0.01$), monetary worth ($\beta = 0.244$, $p < 0.01$), mutual relationships ($\beta = 0.262$, $p < 0.01$), and self-expression ($\beta = 0.207$, $p < 0.01$). Feature-based design innovation shows a positive relationship with monetary worth ($\beta = 0.367$, $p < 0.01$), mutual relationships ($\beta = 0.339$, $p < 0.05$), and self-expression ($\beta = 0.258$, $p < 0.01$), but no significant association with visual authority ($\beta = -0.058$, *n.s.*). Emotion positively affects visual authority ($\beta = 0.435$, $p < 0.01$), monetary worth ($\beta = 0.264$, $p < 0.01$), and self-expression ($\beta = 0.305$, $p < 0.01$), but not mutual relationship ($\beta = 0.118$, *n.s.*). In addition, perceived value increases purchase intention, except in the case of visual authority. That is, three among the four elements of perceived value have a positive impact on purchase intention: monetary worth ($\beta = 0.438$, $p < 0.01$), mutual relationship ($\beta = 0.226$, $p < 0.01$), and self-expression ($\beta = 0.218$, $p < 0.01$); but not visual authority ($\beta = -0.115$, $p < 0.05$). Thus, the pooled data supports H_1 and H_2 .

Table 2
Descriptive statistics of the key constructs.

		Pooled data	Consumer groups		
			Economic enthusiasts	Spontaneous supporters	Frugal rationalists
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Design innovation	Aesthetics	4.535 (1.250)	4.590 (1.299)	4.631 (1.175)	4.387 (1.252)
	Features	4.277 (1.443)	4.273 (1.503)	3.882 (1.570)	3.923 (1.476)
	Emotion	4.589 (1.572)	4.621 (1.604)	4.889 (1.549)	4.291 (1.513)
Perceived value	Visual authority	5.323 (1.316)	5.321 (1.408)	5.493 (1.154)	5.177 (1.330)
	Monetary worth	3.589 (1.494)	3.899 (1.476)	3.662 (1.650)	3.158 (1.264)
	Mutual relationship	3.897 (1.516)	4.048 (1.508)	4.127 (1.634)	3.516 (1.349)
	Self-expression	3.562 (1.457)	3.573 (1.553)	3.716 (1.555)	3.416 (1.231)
Purchase intention		3.066 (1.669)	3.343 (1.722)	3.281 (1.780)	2.550 (1.372)

Table 3
Results of group-specific hypotheses tests.

		Pooled data ^a	Consumer groups		
			Economic enthusiasts ^b	Spontaneous supporters ^c	Frugal rationalists ^d
		Estimate	Estimate	Estimate	Estimate
H ₁	Aesthetics → visual authority	0.379**	0.559**	0.290*	0.240
	Aesthetics → monetary worth	0.244**	0.320**	0.507**	-0.037
	Aesthetics → mutual relationship	0.262**	0.256*	0.589**	-0.005
	Aesthetics → self-expression	0.207**	0.210	0.513**	-0.014
	Features → visual authority	-0.058	-0.101	-0.057	0.044
	Features → monetary worth	0.367**	0.345**	0.393**	0.301*
	Features → mutual relationship	0.339**	0.336**	0.269*	0.418*
	Features → self-expression	0.258**	0.254*	0.258**	0.201
	Emotion → visual authority	0.435**	0.287**	0.485**	0.534**
	Emotion → monetary worth	0.264**	0.261*	0.091	0.432**
	Emotion → mutual relationship	0.118	0.195	-0.047	0.084
	Emotion → self-expression	0.305**	0.226	0.292**	0.392**
	H ₂	Visual authority → purchase intention	-0.115*	-0.224*	0.178
Monetary worth → purchase intention		0.438**	0.354**	0.409**	0.492**
Mutual relationship → purchase intention		0.226**	0.243*	-0.042	0.420**
Self-expression → purchase intention		0.218**	0.335**	0.271	0.172

Note: * and ** denote significance at the 0.05 and 0.01 levels, respectively.
^a $\chi^2_{(190)} = 571.512$ ($p < 0.001$), IFI = 0.928, CFI = 0.928, TLI = 0.912, RMSEA = 0.075.
^b $\chi^2_{(190)} = 398.922$ ($p < 0.001$), IFI = 0.899, CFI = 0.897, TLI = 0.875, RMSEA = 0.089.
^c $\chi^2_{(190)} = 388.391$ ($p < 0.001$), IFI = 0.880, CFI = 0.877, TLI = 0.850, RMSEA = 0.102.
^d $\chi^2_{(190)} = 349.631$ ($p < 0.001$), IFI = 0.915, CFI = 0.913, TLI = 0.894, RMSEA = 0.085.

5.2.2. Economic enthusiasts

Aesthetics affect visual authority ($\beta = 0.559, p < 0.01$), monetary worth ($\beta = 0.320, p < 0.01$), and mutual relationship ($\beta = 0.256, p < 0.05$); but not self-expression ($\beta = 0.210, n.s.$). Features positively affect monetary worth ($\beta = 0.345, p < 0.01$), mutual relationship ($\beta = 0.336, p < 0.01$), and self-expression ($\beta = 0.254, p < 0.05$); but not visual authority ($\beta = -0.101, n.s.$). Emotion positively affects visual authority ($\beta = 0.287, p < 0.01$) and monetary worth ($\beta = 0.261, p < 0.01$), but not mutual relationship ($\beta = 0.195, n.s.$) or self-expression ($\beta = 0.226, n.s.$). Perceived value is related to purchase intention; purchase intention is positively affected by monetary worth ($\beta = 0.354, p < 0.01$), mutual relationship ($\beta = 0.243, p < 0.05$), and self-expression ($\beta = 0.335, p < 0.01$); however, visual authority ($\beta = -0.224, p < 0.05$) has a negative effect on purchase intention.

5.2.3. Spontaneous supporters

Aesthetics exert positive influence on all four elements of perceived value: visual authority ($\beta = 0.290, p < 0.05$), monetary worth ($\beta = 0.507, p < 0.01$), mutual relationship ($\beta = 0.589, p < 0.01$), and self-expression ($\beta = 0.513, p < 0.01$). This group presents the same positive association between features and perceived value as the economic enthusiasts: monetary worth ($\beta = 0.393, p < 0.01$), mutual

relationships ($\beta = 0.269, p < 0.05$), and self-expression ($\beta = 0.258, p < 0.01$); but not visual authority ($\beta = -0.057, n.s.$). Emotion affects visual authority ($\beta = 0.485, p < 0.01$) and self-expression ($\beta = 0.292, p < 0.01$), and has no impact on monetary worth or mutual relationship. Among the four elements of perceived value, only monetary worth ($\beta = 0.409, p < 0.01$) positively affects purchase intention, while the others show insignificant relationships.

5.2.4. Frugal rationalists

Interestingly, in this group, perceived value is largely affected by features and the emotion of design innovation. Features positively influence monetary worth ($\beta = 0.301, p < 0.05$), and mutual relationship ($\beta = 0.418, p = 0.01$). Emotion positively affects visual authority ($\beta = 0.534, p < 0.01$), monetary worth ($\beta = 0.432, p < 0.01$), and self-expression ($\beta = 0.392, p < 0.01$). Purchase intention is positively influenced by monetary worth ($\beta = 0.492, p < 0.01$) and mutual relationship ($\beta = 0.420, p < 0.01$), but negatively by visual authority ($\beta = -0.276, p < 0.01$).

5.2.5. Summary

In general, the empirical results support H₁ and H₂. That is, design innovation leads to perceived value, which, in turn, increases purchase intention. Moreover, three groups present substantial differences in the

detailed relationships proposed in H₁ and H₂, suggesting H₃ and H₄. Economic enthusiasts and spontaneous supporters see the links between design innovation and perceived value in very similar ways, whereas, the frugal rationalists tend to focus on features and emotion. The relationship between perceived value and purchase intention also shows stark differences; economic enthusiasts and frugal rationalists are influenced by three to four of the elements of perceived value, while purchase intention among spontaneous supporters is influenced solely by monetary worth. Interestingly, visual authority negatively affects the purchase intention of the economic enthusiasts and the frugal rationalists, representing a suppression effect. In other words, those who appreciate the economic value of the augmented product are less likely to purchase a skin with the intention of showing off, as in the case of luxury goods (Wiedmann et al., 2009). In order to statistically examine the pairwise differences across the three groups, we proceed to assess H₃ and H₄.

5.3. Multi-group hypotheses tests

The tests of H₃ and H₄ exploit the multi-group analyses results to examine pairwise group differences in the relationships among innovative design, perceived value, and purchase intention. Table 4 shows the multi-group results. Again, after discussing the test results of H₃ and H₄, we provide the corresponding interpretation.

5.3.1. Economic enthusiasts vs. spontaneous supporters

The measurement invariance test confirms that both groups are compared using the same items for each construct ($\Delta\chi^2_{(14)} = 18.851, p > 0.05$). Moreover, the chi-square difference test supports full structural invariance ($\Delta\chi^2_{(16)} = 36.416, p < 0.01$) with significant differences in the relationships among variables in the unconstrained and constrained models in which the hypothesized effects are constrained to be invariant across groups. These two groups largely behave the same as hypothesized in H₁ and H₂, with aesthetics being the exception; aesthetics exert greater influence on spontaneous supporters when driving monetary worth, mutual relationship, and self-expression. Moreover, compared with the economic enthusiasts, visual authority drives greater purchase intention among spontaneous supporters.

Table 4
Results of multi-group hypotheses tests.

		Economic enthusiasts vs. spontaneous supporters ^a	Economic enthusiasts vs. frugal rationalists ^b	Spontaneous supporters vs. frugal rationalists ^c
		χ^2 -Value	χ^2 -Value	χ^2 -Value
H ₃	Aesthetics → visual authority	1.161	0.057	0.480
	Aesthetics → monetary worth	4.695*	7.376**	13.672**
	Aesthetics → mutual relationship	6.622*	5.109*	12.504**
	Aesthetics → self-expression	6.571*	2.066	12.768**
	Features → visual authority	0.240	0.459	0.296
	Features → monetary worth	0.028	5.200*	0.352
	Features → mutual relationship	0.311	2.465	0.624
	Features → self-expression	0.003	1.790	0.226
	Emotion → visual authority	0.744	1.459	0.556
	Emotion → monetary worth	0.835	1.459	3.036
H ₄	Emotion → mutual relationship	1.865	5.068*	0.531
	Emotion → self-expression	0.826	0.480	0.004
	Visual authority → purchase intention	7.947**	0.020	10.140**
	Monetary worth → purchase intention	0.045	0.021	0.160
	Mutual relationship → purchase intention	2.668	0.060	6.487*
	Self-expression → purchase intention	0.242	0.513	0.139

Note: * and ** denote significance at the 0.05 and 0.01 levels, respectively.
^a $\chi^2_{(380)} = 787.460 (p < 0.001), IFI = 0.891, CFI = 0.888, TLI = 0.864, RMSEA = 0.067.$
^b $\chi^2_{(380)} = 748.564 (p < 0.001), IFI = 0.907, CFI = 0.905, TLI = 0.884, RMSEA = 0.062.$
^c $\chi^2_{(380)} = 738.078 (p < 0.001), IFI = 0.899, CFI = 0.896, TLI = 0.874, RMSEA = 0.066.$

5.3.2. Economic enthusiasts vs. frugal rationalists

Similar to the above, the item and construct level equivalence between the two groups is confirmed using the measurement invariance test ($\Delta\chi^2_{(14)} = 14.138, p > 0.05$) and the chi-square difference test for the unconstrained and constrained structural models supports the full structural invariance ($\Delta\chi^2_{(16)} = 24.290, p < 0.10$). The significant difference between groups is apparent in the relationships among the elements of design innovation and perceived value. Specifically, this is driven by the fact that economic enthusiasts consider innovations in aesthetics, features, and emotion, whereas, the frugal rationalists place a greater emphasis on features.

5.3.3. Spontaneous supporters vs. frugal rationalists

Again, the measurement invariance test ($\Delta\chi^2_{(14)} = 19.569, p > 0.05$) and the chi-square difference test ($\Delta\chi^2_{(16)} = 83.418, p < 0.01$) support the validity of the multi-group test between the groups of spontaneous supporters and frugal rationalists. These groups show significant difference in the relationships between aesthetics and perceived value and between perceived value and purchase intention. These differences are largely driven by not only greater positivity but also the negative value for visual authority to purchase intention.

5.3.4. Summary

In general, the multi-group analyses results indicate differences in the relationships among design innovation, perceived value, and purchase intention across the three groups, supporting H₃ and H₄. The economic enthusiasts and spontaneous supporters are close to each other, whereas, the frugal rationalists diverge significantly from the other groups; thus, we infer that frugal rationalists appreciate utilitarian value even with hedonic augmented products. The substantial differences emerge around aesthetics and perceived value, followed by perceived value of visual authority and purchase intention due to the insignificance of visual authority in the group of spontaneous supporters.

6. Conclusion

This study focuses on design innovation, perceived value, and purchase intention, and demonstrates that these inter-relationships operate with augmented products. In the context of augmented products,

innovative design attributes (i.e. aesthetics, features, and emotion) determine perceived value (i.e. visual authority, monetary worth, mutual relationship, and self-expression) and, in turn, influence purchase intention. The multi-group analyses provide additional findings that economic enthusiasts and frugal rationalists reveal a comprehensive product perception and evaluation, while spontaneous supporters focus on the economic value of the augmented product. Interestingly, visual authority negatively affects purchase intention among economic enthusiasts and frugal rationalists, representing a suppression effect.

6.1. Theoretical contributions

Our study makes the following theoretical contributions. First, our findings add to the literature on augmented products. Despite extensive prior research on core and expected products, research on augmented products and design innovation is relatively seminal. Our work provides a basis for further development in related theories. Second, we identify each set of components composing design innovation, perceived value, and purchase behavior, respectively, for augmented products. Our empirical approach not only tests the proposed hypotheses but also shows how to measure each construct using multiple items. Third, the multi-group analyses help understand group-level differences in the purchasing of augmented products. Economic enthusiasts and frugal rationalists, for example, have negative attitudes toward visual authority in the augmented product context, whereas, the spontaneous supporters are relatively immune to the impact of visual authority.

6.2. Managerial contributions

We provide the following practical insights for augmented product management over time and across consumer groups. First, when introducing augmented products, companies should determine how extensively they want to alter their core and expected products and then incorporate innovative designs into their augmented products. This design aspect, while having target segments in mind, can create a point-of-difference in product positioning as well as a competitive advantage over other products. Second, the effect of perceived value on purchase intention may suggest that early on, companies should launch reasonably priced basic and functional products, and then, over time, introduce innovatively designed augmented products. In this case, augmented products should include aesthetic and emotional elements to benefit from the creation of a long-term company-consumer relationship, thereby encouraging consumers to select goods that are congruent with their self-image.

Finally, the substantial multi-group difference indicates that people do not always value augmented products for hedonic reasons. Frugal rationalists do not reveal attitudes toward the aesthetic aspects of design innovation in augmented products. This implies that those who value utilitarian benefits exploit utilitarian elements of cost-effectiveness while ignoring aesthetics of product design, and companies should consider both utilitarian and hedonic qualities to improve market performance. If companies need to narrow their focus on specific segments due to resource-related issues, they should strategically consider not only the market size of the segments but also whether their capabilities can be aligned with the needs of that segment.

6.3. Limitations and directions for future research

This study has several limitations that call for future research. First, personal characteristics can affect purchase intention and behavior (Han, Thao Nguyen, & Anh Nguyen, 2016), and future study should consider personal characteristics to gain a more in-depth understanding of consumers. Second, we focus on gamers in South Korea, and more countries in which game items are widely transacted should be taken into account to help generalize the empirical findings. Third, we examine the online game League of Legends, and its game items called

skins as augmented products. Various other augmented products should be topics for future research.

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