

Assessing adverse effects of inferior innovations with brand innovability: perspectives of consumer innovativeness

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Abstract: This research examines the adverse effects of inferior innovative extensions on the brand innovability and quality of own parent brands from the perspective of consumer innovativeness. The results reveal that inferior radical innovations weaken the perceptions of brand innovability and quality of high-innovativeness consumers less than the perceptions of brand innovability and quality of low-innovativeness consumers. Conversely, inferior incremental innovations weaken the perceptions of brand innovability and quality of low-innovativeness consumers less than the perceptions of brand innovability and quality of high-innovativeness consumers. In comparison, brand innovability is less susceptible than brand quality to inferior innovation information. The threats of inferior innovations are less detrimental than expectation if the adverse effects are assessed with brand innovability, instead of brand quality. The findings suggest that brand innovability is a more justifiable indicator than brand quality in evaluating the adverse effects of inferior innovations.

Keywords: brand innovability; consumer innovativeness; adverse effect; inferior innovation.

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Introduction

Wearable smart devices represent a major trend in high-tech markets, among which smart glasses were generating significant interest. Google Glass, the pioneer of smart glasses, was recognized as one of the “Best Invention of the Year 2012” (Time, 2012) and hailed as the “next big thing” in high-tech (Woollaston, 2014). To test the market and stimulate application developers’ interests, Google Glass strategically launched its Explorer version for developers in Feb. 2013 and publicly unveiled the conceptual Explorer version for consumers in May 2014. However, given the price of US\$1,500, test users were disappointed with the product design, specifically battery life, data access, heat generation, voice recognition, and nerdy image. As a result, only thousands, rather than the estimated millions, of Google Glass were shipped a year after its launch. Moreover, roughly about 80 percent of Glass application developers either abandoned or suspended application development for Glass. Industry experts were generally pessimistic about the future of Google Glass given the concerns of problematic product design, emerging substitutes (e.g., action cameras, smart watches), privacy intrusion (e.g., video recording), and augmented reality incapability (e.g., widespread adoption for the mainstream). The same industry experts predicted the death of and recommended Google abandon the Glass before its commercial launch. In response to the overwhelming criticism, Google reconfirmed its commitment to develop the Glass and announced indefinite postponement for the release of the consumer version originally scheduled for 2014 (Haydin, 2014; Metz, 2014; Rowinski, 2016; Sun, 2014).

Is the failure of Google Glass damaging to Google? Why did Google insist on sustaining the problematic Glass? The Google Glass case raises several questions about the adverse impacts of innovation failures on brands (e.g., Google). For example, will the failures of high-tech

innovations (e.g., Google Glass) be more detrimental to brands? Will innovative brands (e.g., Google) be more vulnerable to innovation failures? Are fans of high-tech innovations (or innovators) more susceptible to innovation failures?

In innovation research, innovability is utilized to describe the capability to innovate (e.g., Dahlgaard-Park & Dahlgaard, 2010). Profiting firms (e.g., Google) are typically innovative companies with high innovability in inventing high-tech innovations (Jonash & Sommerlatte, 1999; Nedergaard & Gyrd-Jones, 2013), which are relevant to the increases of long-term performance, including the bottom line of firm income, the top-line of firm revenue, and the firm value in stock markets (Pauwels, Silva-Risso, Srinivasan, & Hanssens, 2004). Thus, in addition to brand quality, brand innovability has become an important indicator evaluating brand health. Moreover, extant research in brand evaluations has widely investigated the adverse effects of brand extensions (e.g., Google Glass) on their family brand names (e.g., Google), which are moderated by the characteristics of brands (e.g., Gurhan-Canli, 2003), brand extensions (e.g., Arslan & Altuna, 2010; Dimitriu, Warlop, & Samuelsen, 2017; Liao, Chou, & Lin, 2015), and perceivers (e.g., Salinas & Pérez, 2009). However, these studies mainly discuss the adverse impacts of regular extensions on regular brands specifically in the perspective of brand quality. Less is known about the adverse impact of inferior innovations (as brand extensions) specifically on brand innovability.

Moreover, extant research in innovation documents that consumer innovativeness is relevant to the evaluations of brand extensions (Salinas & Pérez, 2009). High-innovativeness consumers prefer, and have higher adoption rates for, high-tech extensions than low-innovativeness consumers (e.g., Bartels & Reinders, 2011; Tellis, Yin, & Bell, 2009). However, the previous research mainly discusses the relevance

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between consumer innovativeness and the evaluation and adoption of extensions. Less is known about the moderation of consumer innovativeness on the adverse effects of inferior innovations from both the perspectives of brand innovability and quality. Therefore, this research advances innovation research by examining the adverse effects of inferior innovations on brand innovability and quality from the perspective of consumer innovativeness.

Theoretical Background

Brand innovability

In innovation research, the capability of innovation is discussed with various, but interchangeable, terminologies including innovability, capability to innovate (Dahlgaard-Park & Dahlgaard, 2010), innovation ability (Schreier, Fuchs, & Dahl, 2012), innovativeness capability (Luo & Bhattacharya, 2006), and perceived innovativeness (Kunz, Schmitt, & Meyer, 2011). Specifically, Dahlgaard-Park and Dahlgaard (2010) create the terminology of innovability to represent the ability to innovate for the development of a system for assessing and improving technology development and innovations. The research scope is mainly from the perspectives of firms. Luo and Bhattacharya (2006) delineate that firms with low innovativeness capability are highly correlated with low customer satisfaction and market value. Kunz and colleagues (2011) uncover that perceived innovativeness affects consumer loyalty via the two processing routes of functional-cognitive and affective-experiential routes. Moreover, Schreier and colleagues (2012) depict that common design by users enhances consumers' perceptions of innovation ability. While similar concepts about innovability were utilized to examine innovation research questions, none of them investigates the adverse effects of inferior innovations on brand innovability.

To be consistent, this study adopts the shortest terminology of innovability for its novelty and uniqueness and to differentiate it from the innovativeness of innovative brands and extensions. Moreover, based on the extant research, innovability can be more comprehensively defined as the ability to generate new and useful products/services innovatively (Brown & Dacin, 1997; Dahlgaard-Park & Dahlgaard, 2010; Luo & Bhattacharya, 2006; Rust, Moorman, & Dickson, 2002; Schreier et al., 2012; Zeithaml, 2000).

Brand innovability and quality

In innovation research, brand (or corporate) abilities consist of brand quality and innovability, which refer to a brand's (or firm's) ability to improve existing brand quality and generate new innovations (Luo & Bhattacharya, 2006; Rust et al., 2002; Zeithaml, 2000). The definition suggests that innovative brand's quality is associated with, and affected by, its innovative extensions' quality, whereas innovative brand's innovability is associated, and affected by, its innovative extensions' innovativeness.

However, innovability is not just about the creation of creative and novel innovations (Kunz et al., 2011). The created innovations have to be (of good quality to be) useful in order to survive and exert market

impacts, which is the third key point of an innovative brand (Kunz et al., 2011; Schreier et al., 2012). A brand with the characteristics of novelty and creativity is insufficient to be a high-innovability brand if its innovations are of low quality and, thus, useless. Moreover, operationally, the first three measures of the brand innovability scale (Schreier et al., 2012; see the Appendix) capture the relevance between brand innovability and extension quality (i.e., "In my opinion, the innovation ability of this company is high/low," "In my opinion, the innovation ability of this company is weak/strong," and "In my opinion, the innovation ability of this company is poor/excellent"). As a result, brand innovability is relevant to, and affected by, innovation quality, in addition to extension innovativeness. Consumers' judgment about brand innovability is jointly affected by both the innovativeness and quality of innovative extensions. In contrast, consumers' judgment about brand quality is affected by the quality of innovative extensions alone. Thus, the influence of inferior innovative extensions on the innovability and quality of own parent brands are supposed to be different.

Moreover, brands are characterized as pioneers, opportunists, and followers on the basis of innovability, whereas new innovations are classified as incremental, substantial (or breakthrough), and radical (or transformational) offerings on the basis of product innovativeness (e.g., newness, value-add) (Crawford, 2014). Specifically, pioneers are high in innovability and commit to radical innovations, which create new industries and transform the way people live and work. In contrast, followers are low in innovability and engage in incremental innovations, which are continuously improved products or technological processes. The discussion about the adverse effects of new innovations on own parent brands consists of four conditions: the adverse impacts of (a) radical innovations on pioneer brands; (b) radical innovations on follower brands; (c) incremental innovations on pioneer brands; and (d) incremental innovations on follower brands.

Consumer innovativeness

Consumer innovativeness is a personal trait defined as consumers' inclination to embrace new products (Tellis et al., 2009). High- and low-innovativeness consumers prefer radical and incremental innovations, respectively. The construct of consumer innovativeness consists of ten elements across the three dimensions of openness to new things, enthusiasm for new products, and reluctance to adopt new products. The consumer innovativeness concept is captured by averaging the ten innovativeness measures (Tellis et al., 2009; see the Appendix).

The impacts on brand quality

Among the ten traits of consumer innovativeness (Tellis et al., 2009), risk aversion is one primary characteristic to differentiate the reception of new innovations of high- and low-innovativeness consumers (Raju, 1980; Rogers, 1995). In evaluating innovations, consumers with higher tolerance for risk (i.e., high-innovativeness consumers) are more receptive to radical (or low-fit) innovations. In contrast,

consumers with lower tolerance for risk (i.e., low-innovativeness consumers) are less receptive to the relatively higher risk associated with the radical extensions (Klink & Smith, 2001). As a result, high-innovativeness consumers more tolerate the failures of radical innovations than low-innovativeness consumers (Klink & Smith, 2001). The toleration ameliorates the negative impacts of inferior radical innovations on brand quality. Specifically, inferior radical innovations less saliently weaken high-innovativeness consumers' perception of brand quality. In contrast, low-innovativeness consumers more tolerate the failures of incremental innovations (Klink & Smith, 2001). The toleration ameliorates the negative impacts of inferior incremental innovations on brand quality. As a result, inferior incremental innovations less saliently weaken low-innovativeness consumers' perception of brand quality. Thus,

H1a: Inferior radical innovations weaken the perception of brand quality of high-innovativeness consumers less than the perception of brand quality of low-innovativeness consumers.

H1b: Inferior incremental innovations weaken the perception of brand quality of low-innovativeness consumers less than the perception of brand quality of high-innovativeness consumers.

The impacts on brand innovability

Brand innovability consists of the two dimensions of brand quality and brand innovativeness (Kunz et al., 2011; Schreier et al., 2012), which correspond to extension quality and innovativeness, respectively. Thus, the evaluations of brand innovability are affected by extension quality and innovativeness. Contrary to the negative impact of inferior extension quality, extension innovativeness is positive force enhancing brand innovativeness. The enhancement equally counterbalances the negative impacts of inferior innovations on both high- and low-innovativeness consumers' perception of brand quality. Moreover, hypothesis 4a states that inferior radical innovations instigate less negative impacts on high-innovativeness consumers' perception of brand quality. By combining the impacts of extension quality and innovativeness, it is expected that inferior radical innovations also instigate less negative impacts on high-innovativeness consumers' perception of brand innovability. In contrast, hypothesis 4b states that inferior incremental innovations instigate less negative impacts on low-innovativeness consumers' perception of brand quality. By combining the impacts of extension quality and innovativeness, it is expected that inferior incremental innovations also instigate less negative impacts on low-innovativeness consumers' perception of brand innovability. Therefore,

H2a: Inferior radical innovations weaken the perception of brand innovability of high-innovativeness consumers less than the perception of brand innovability of low-innovativeness consumers.

H2b: Inferior incremental innovations weaken the perception of brand innovability of low-innovativeness consumers less than the perception of brand innovability of high-innovativeness consumers.

In comparison, the impacts of inferior innovations on brand innovability are affected by both the innovativeness and quality of innovations (Kunz et al., 2011; Schreier et al., 2012), whereas the impacts on brand quality are mainly determined by innovation quality (Luo & Bhattacharya, 2006; Rust et al., 2002; Zeithaml, 2000). Given that, the negative impacts of inferior innovations on brand innovability get the chance to be counterbalanced by the positive impacts of extension innovativeness. As a result, brand innovability appears less saliently weakened than brand quality by inferior innovations. However, the counterbalance effect of extension innovativeness diminishes when the level of extension innovativeness is lower than the level of brand innovativeness (e.g., pioneer brands with inferior incremental innovations). Under the situation, the negative impacts of inferior innovations on brand quality and innovability turn to be indifferent. Thus,

H3. Inferior innovation information weakens brand quality more than brand innovability, except the condition when the brand is a pioneer brand and the inferior extension is an incremental innovation.

Methodology

Materials

In line with previous research and for the ease of manipulation (e.g., Loken & Roedder-John, 1993), the fictitious names of Appsung and Appsung V6 were created to represent the innovative brand and new innovative extension. The Appsung brand name was based on the two major smartphone makers of Apple and Samsung for the ease of high quality associations. The experimental treatments of the Appsung brand and Appsung V6 extension were cultivated with PC Home assessments.

As the launches of radical innovations were unlikely for low-innovability brands in reality, this study examined the adverse effects of radical and incremental innovations specifically on pioneer brands. The pioneer Appsung brand was portrayed as a smartphone pioneer (i.e., "pioneering a few patented breakthrough innovations;" see the Appendix). The high- and low-innovativeness Appsung V6 were delineated as a radical (i.e., "with wireless charging and hyper processor;" see the Appendix) and incremental (i.e., "with higher display resolution;" see the Appendix) innovations, respectively. There are internal and external reasons causing the failure of an innovation. This research specifies the internal reason of inferior innovation with low-quality.

Subjects and procedures

The data were collected online via the Amazon Mechanical Turk (www.mturk.com) with Qualtrics questionnaires (www.qualtrics.com). One hundred and fifty-two smartphone users residing in the USA ($M_{\text{age}} = 33.68$, 75 females, 77 males) were randomly assigned to the 2 (consumer innovativeness: high vs. low) x 2 (extension innovativeness: high vs. low) between-subjects factorial design. Consumer innovativeness was captured with the 10-item consumer innovativeness scale developed by Tellis et al. (2009) (see the Appendix).

The participants were informed that the purpose of study was to investigate consumer opinions about smartphones. The participants started with reading the PC Home assessment about the Appsung brand and rating the prior quality and innovability of the Appsung brand, followed by a series of rating tasks including the quality and innovativeness of the newly launched Appsung V6 and the posterior quality and innovability of the Appsung brand. Prior and posterior brand quality was captured with the three-item brand attitude measure of quality, favorability, and desirability (e.g., Kempf & Smith, 1998). The brand innovability was captured with the seven-item innovation ability measures (Luo & Bhattaoharya, 2006; Rindfleisch & Moorman, 2001; Schreier et al., 2012; see the Appendix). The extension innovativeness was identified with the 9-item product innovativeness measure (Lee & O'Connor, 2003; see the Appendix).

Results

Manipulation checks

Scale reliability analyses on the multiple-item measures of brand quality, brand innovability, and extension innovativeness yielded high levels of reliability ($\alpha_s \geq .89$). Thus, the indices were formulated by averaging the scores of multiple items, respectively.

T-tests and one-way ANOVAs revealed that (a) the innovability levels of Appsung in the conditions of inferior radical and incremental Appsung V6 are equal ($M_{radical} = 5.77, M_{incremental} = 5.82, F(1, 150) = .10, p > .10$) and moderately high ($M_{radical} = 5.77, M_{neutral} = 4.00, t(69) = 19.44, p < .001, M_{pos-xtrm} = 7.00, t(69) = -12.56, p < .001; M_{incremental} = 5.82, M_{neutral} = 4.00, t(81) = 21.19, p < .001, M_{pos-xtrm} = 7.00, t(81) = -13.83, p < .001$); (b) the quality levels of Appsung in the conditions of inferior radical and incremental Appsung V6 are equal ($M_{radical} = 5.95, M_{incremental} = 6.12, F(1, 150) = 1.26, p > .10$) and moderately high ($M_{radical} = 5.95, M_{neutral} = 4.00, t(69) = 16.42, p < .001, M_{pos-xtrm} = 7, t(69) = -8.72,$

$p < .001; M_{incremental} = 6.12, M_{neutral} = 4.00, t(81) = 23.80, p < .001, M_{pos-xtrm} = 7, t(81) = -9.85, p < .001$); (c) the innovativeness levels of inferior radical and incremental Appsung V6 are high ($M_{radical} = 4.82, M_{neutral} = 4.00, t(69) = 9.76, p < .001$) and low ($M_{incremental} = 3.45, M_{neutral} = 4.00, t(81) = -4.32, p < .001$), respectively; and (d) both the inferior radical and incremental innovations were moderately low quality ($M_{radical} = 1.87, M_{neutral} = 4.00, t(69) = -26.08, p < .001, M_{neg-xtrm} = 1.00, t(69) = 10.72, p < .001; M_{incremental} = 2.88, M_{neutral} = 4.00, t(81) = -8.05, p < .001, M_{neg-xtrm} = 1.00, t(81) = 13.55, p < .001$).

Thus, the independent variables of Appsung's innovability and Appsung V6's quality and innovativeness were properly manipulated. Specifically, the levels of brand innovability and quality and extension quality and innovativeness were carefully crafted to be moderately high to prevent the bias of ceiling effect.

Test of hypotheses

The impacts on brand quality

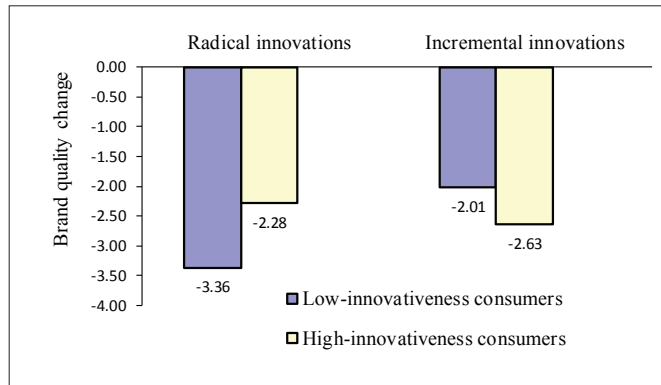
A median split was used to classify participants as being low innovativeness (those whose scores were 4.59 or less, $n = 75, M_{low} = 3.96$) or high innovativeness (those whose scores were greater than 4.59, $n = 77, M_{high} = 5.21$). Two-way ANOVA on the quality change index yielded the main effect of extension innovativeness ($F(1, 148) = 9.51, p < .05$) and the interaction of consumer innovativeness and extension innovativeness ($F(1, 148) = 14.54, p < .001$). Specifically, simple-effects tests revealed that the inferior radical Appsung V6 instigated less negative impacts on high-innovativeness respondents' perception of Appsung quality ($M_{low} = -3.36, M_{high} = -2.28, F(1, 148) = 10.87, p < .001$). As a result, hypothesis 1a was supported (see Table 1 & Figure 1). Moreover, inferior incremental Appsung V6 instigated less negative impacts on low-innovativeness respondents' perception of Appsung quality ($M_{low} = -2.01, M_{high} = -2.63, F(1, 148) = 4.21, p < .05$). As a result, hypothesis 1b was supported.

Table 1. Summary of the Main Study: Means and Standard Deviations.

Innovation	Consumer Innovativeness		Comparison (F value)	Hypo.	Results
	High-innovativeness	Low-innovativeness			
Quality change index					
Radical	-2.28 (1.48)	-3.36 (1.17)	10.87***	H1a	Supported
Incremental	-2.63 (1.48)	-2.01 (1.30)	4.21*	H1b	Supported
Innovability change index					
Radical	-1.41 (1.37)	-2.32 (1.13)	8.45**	H2a	Supported
Incremental	-2.56 (1.49)	-1.84 (1.18)	6.25*	H2b	Supported
Consumer Innovativeness	Change of Index		Comparison (t value)	Hypo.	Results
	Quality change	Innovability change			
High-innovativeness					
Radical	-2.28 (1.48)	-1.41 (1.37)	-2.86**	H3	Supported
Incremental	-2.63 (1.48)	-2.56 (1.49)	-.44	H3	Supported
Low-innovativeness					
Radical	-3.36 (1.17)	-2.32 (1.13)	-5.63***	H3	Supported
Incremental	-2.01 (1.30)	-1.84 (1.18)	-1.19	H3	Supported

*: $p < .05$; **: $p < .01$; ***: $p < .001$.

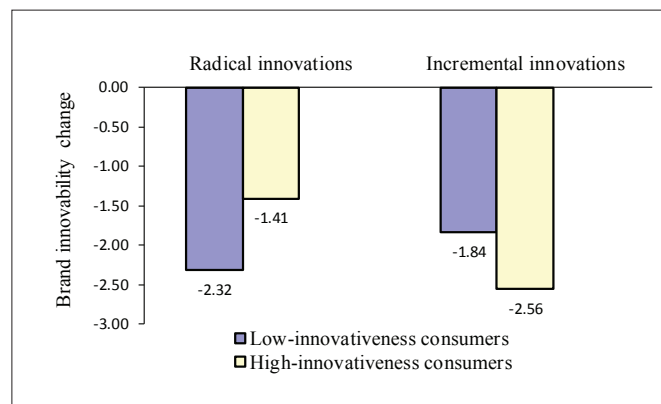
Figure 1. The adverse effects of inferior extensions on the perceptions of high- and low-innovativeness consumers on brand quality.



The impacts on brand innovability

Two-way ANOVA on the innovability change index yielded the interaction of consumer innovativeness and extension innovativeness ($F(1, 148) = 14.68, p < .001$). Specifically, simple-effects tests revealed that the inferior radical Apsung V6 instigated less impacts on high-innovativeness respondents' perception of the innovability Apsung ($M_{low} = -2.32, M_{high} = -1.41, F(1, 148) = 8.45, p < .01$) (see Figure 2). Thus, hypothesis 2a was confirmed. Moreover, the inferior incremental Apsung V6 instigated less negative impacts on low-innovativeness respondents' perception of the innovability of Apsung ($M_{low} = -1.84, M_{high} = -2.56, F(1, 148) = 6.25, p < .05$). Thus, hypothesis 2b was confirmed.

Figure 2. The adverse effects of inferior extensions on the perceptions of high- and low-innovativeness consumers on brand innovability.



The susceptibility of brand innovability and quality

Pair-samples t-tests revealed that the innovability (vs. quality) of pioneer Apsung was less significantly weakened by the inferior radical Apsung V6, regardless of consumer innovativeness ($M_{innovability} = -2.32, M_{quality} = -3.36, t(36) = -5.63, p < .001; M_{innovability} = -1.41, M_{quality} = -2.28, t(32) = -2.86, p < .01$) (see Figures 3 & 4). However, both the innovability and quality of pioneer Apsung were identically weakened by the inferior incremental Apsung V6, regardless of consumer innovativeness ($M_{innovability} = -1.84, M_{quality} = -2.01, t(37) = -1.19, p > .05; M_{innovability} = -2.56, M_{quality} = -2.63, t(43) = -.44, p > .05$). Therefore, hypothesis 3 was confirmed.

Figure 3. The vulnerability of brand quality and innovability toward inferior innovation information for high-innovativeness consumers.

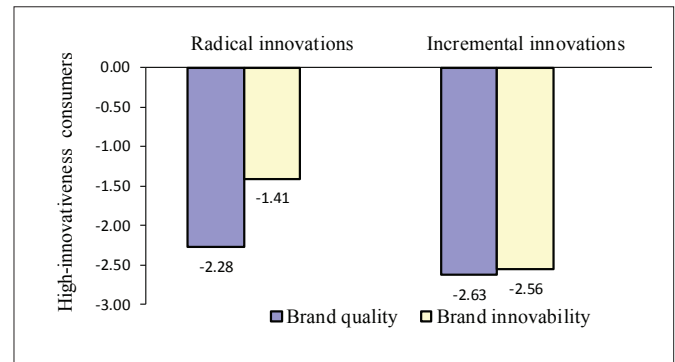
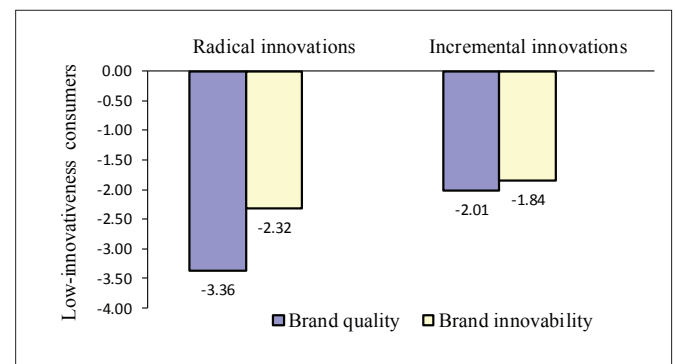


Figure 4. The vulnerability of brand quality and innovability toward inferior innovation information for low-innovativeness consumers.



In conclusion, the impacts of inferior radical and incremental innovations exert asymmetric impact patterns on consumers' perception of brand quality. Specifically, inferior radical innovations instigate less negative impacts on high-innovativeness consumers' perception of brand quality. Adversely, inferior incremental innovations instigate less negative impacts on low-innovativeness consumers' perception of brand quality.

As with the impact patterns on brand quality, inferior radical and incremental innovations also exert asymmetric impact patterns on consumers' perception of brand innovability. Inferior radical innovations instigate less negative impacts on high-innovativeness consumers' perception of brand innovability. In contrast, inferior incremental innovations instigate less negative impacts on low-innovativeness consumers' perception of brand innovability. Moreover, in comparison, the quality of pioneer brands is more susceptible than the innovability of pioneer brands to the quality of inferior radical innovations, regardless of consumer innovativeness. In contrast, the quality and innovability of pioneer brands are equally susceptible to inferior incremental innovations, regardless of consumer innovativeness.

Discussion and Conclusions

This article advances innovation research by examining the adverse effects of inferior innovations on brand quality and innovability from the perspectives of consumer innovativeness. The adverse effects of inferior innovations on the perceptions of brand innovability and

quality of high- and low-innovativeness consumers are asymmetric. The research contributes innovation research by proposing the more justifiable and relevant indicator of brand innovability in evaluating innovative brands. Based on the research findings, the theoretical and managerial implications and the limitations and future research are discussed as follows.

Theoretical implications

The study uncovers that inferior radical innovations weaken the perception of brand quality of high-innovativeness consumers than the perception of brand quality of low-innovativeness consumers. In contrast, inferior incremental innovations weaken the perception of brand quality of low-innovativeness consumers less than the perception of brand quality of high-innovativeness consumers. Moreover, inferior radical innovations weaken the perception of brand innovability of high-innovativeness consumers less than the perception of brand innovability of low-innovativeness consumers. Conversely, inferior incremental innovations weaken the perception of brand innovability of low-innovativeness consumers less than the perception of brand innovability of high-innovativeness consumers. In comparison, brand quality is more susceptible than brand innovability to inferior innovation information.

The findings reveal that consumer innovativeness theories (Klink & Smith, 2001; Luo & Bhattacharya, 2006; Tellis et al., 2009) perfectly interpret the research questions. Consumers with higher tolerance for risk (i.e., high-innovativeness consumers) are more receptive to radical innovations. In contrast, consumers with lower tolerance for risk (i.e., low-innovativeness consumers) are less receptive to the relatively higher risk associated with the radical extensions. As a result, high-innovativeness consumer more tolerate the failures of radical innovations than low-innovativeness consumers. The toleration ameliorates the negative impacts of inferior radical innovations on both brand innovability and quality.

The finding suggest that the impacts of inferior innovations on brand innovability are affected by both the innovativeness and quality of innovations, whereas the impacts on brand quality are mainly determined by innovation quality. Brand innovability appears less saliently weakened than brand quality by inferior innovations as the positive impacts of extension innovativeness counterbalance the negative impacts of inferior innovations on brand innovability. However, the counterbalance effect of extension innovativeness turns to be less effective for low-innovativeness extensions.

Managerial implications

The research findings suggest that radical and incremental innovations should target their markets on high- and low-innovativeness consumers, respectively, to maximize the efficiency of innovation adoption and diffusion and minimize possible negative results caused by innovation failures. Given that, it was wise for Google to initially avail the Glass to application developers and, then, the consumer launch to innovators (Haydin, 2014; Metz, 2014; Sun, 2014). Both

of developers and innovators were high-innovativeness consumers, who more preferred and tolerated the inferior Google Glass, a radical innovation. Moreover, the findings also suggest that the assessments about consumers' attitudes toward radical and incremental innovations should differentiate high- and low-innovativeness consumers to accurately reflect the truth of target markets.

In conclusion, the findings suggest that it is more justifiable to evaluate innovative brands with brand innovability, instead of brand quality, for two reasons. Firstly, brand innovability is more realistic than brand quality because brand innovability is more relevant than brand quality to profits. Secondly, brand innovability is inclusive of brand innovativeness, which ameliorates adverse effects when innovative extensions are inferior. The threat of inferior innovative extensions is less detrimental than expectation if the adverse effects on the innovative brands are assessed with brand innovability, instead of brand quality.

Limitations and future research

The three-level consumer innovativeness theory depicts that consumer innovativeness consists of the three levels of innate innovativeness, domain-specific innovativeness, and actualized innovativeness (Bartels & Reinders, 2011; Hoffmann & Soye, 2010). Innate innovativeness is a trait-like construct with the highest level of abstraction in the three-level model. Innate innovativeness consists of cognitive, hedonic, functional, and social innovativeness. Domain-specific innovativeness describes the tendency to adopt innovations in a specific domain, whereas actualized innovativeness is the least abstract level indicating the actual adoption of new products. The discussion about consumer innovativeness of this research is based on Tellis et al.' (2009) consumer innovativeness model specifying the innate innovativeness, the first level of the three-level model. Future research should investigate the moderations of brand innovability, consumer innovativeness, and extension innovativeness on the second and third levels.

Moreover, this research specifically compares the perceiver characteristic of consumer innovativeness on the adverse effects of inferior innovations. Extant research in brand research has identified several personality characteristics of perceivers on brand evaluations (e.g., consumer involvement, subjective knowledge, self-construal, self-regulatory, need of cognition). For example, Reinhardt and Gurtner (2015) report that early adopters of disruptive and sustaining innovations are more knowledgeable and involved consumers, respectively. Research should further examine the moderations of consumer involvement (Mittal & Lee, 1989) and subjective knowledge (Flynn & Goldsmith, 1999), as well as other personality traits, on the adverse effects of inferior innovations. Furthermore, Kunz and colleagues (2011) verify perceived firm innovativeness affects consumer satisfaction and loyalty from two route, the functional-cognitive and affective-experiential routes. This research examines the adverse effects of inferior innovations on brand innovability and quality mainly from the functional-cognitive route. Future research should compare the adverse effects from both routes.

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Appendix

A. Experimental treatments

Pioneer brand:

“Appsung is a leading high-tech brand in the smartphone market. The brand has pioneered a few patented breakthrough innovations of smartphone operating system and physical feature, including larger and better displays, faster video processors, slimmer and durable batteries, and faster and more sensitive cameras. The patented Appsung operating system, supporting third-party applications, is marvelously stable and user-friendly and has become the dominating platform in the smartphone market.” -- *Smartphone experts of PC Home*

Inferior radical innovation:

“The performance of the featured breakthrough innovations was surprisingly unstable and inefficient, which was disappointing.

Wireless charging. The wireless charging device fell short in capturing and connecting the wireless signals of Wi-Fi and internet for battery charging, which induced an unusual long full recharging of about 10 hours. Moreover, the wireless charging obviously heated up the device and incurred a slower operating system.

Hyper processor. The configuration and operation of the hyper video processor for gaming and movies was very unstable. Games and movies got stuck with the processor easily. In comparison, the processing speed was only 30%, rather than four times, faster than regular processors. Moreover, the unstable hyper processor consumed additional battery power and resulted in a much shorter battery life.

The two featured breakthrough innovations had consequently turned the smartphone experience into a nightmare. Given the inferior offer of product benefits, the Appsung V6 clearly falls short compared to its rivals and is overpriced.” – *Smartphone experts of PC Home*

Inferior incremental innovation:

“The Appsung V6 is supposed to be the higher-end variant of Appsung. However, the featured 1920 x 1080 full HD screen does not make the display look better. If this is the best that Appsung has to offer in terms of innovation, then, it is safe to say that any of rivals’ Android flagships blow the Appsung devices out of the water. In terms of specs, features, and price, it’s hard to find a single aspect of the new Appsung flagship that is either powerful or innovative. The Appsung V6 flagship falls short compared to Android rivals. As a result, the new Appsung V6 is overpriced and overrated.” – *Smartphone experts of PC Home*

B. Measurement items

Product innovativeness: (Lee and O’Connor, 2003)

- (1) The technology this product incorporates was new to me
- (2) The benefits this product offers were new to me.
- (3) The product features are novel/unique to me.
- (4) This product introduced many completely new features to the market
- (5) This product offers dramatic improvements to existing product features
- (6) The knowledge required to use this product was new to me
- (7) I need to learn how to use this new product.
- (8) I tend to resist adopting this new product.
- (9) I needed to change my behavior in order to adopt this product.

Brand innovability: (Schreier et al., 2012)

- (1) In my opinion, the innovation ability of this company is high/low.
- (2) In my opinion, the innovation ability of this company is weak/strong.
- (3) In my opinion, the innovation ability of this company is poor/excellent.
- (4) In my opinion, this company has the ability to develop really innovative new products.
- (5) In my opinion, this company is in the position to derive very original product ideas.
- (6) In my opinion, this company has a large potential to foster creativity.
- (7) In my opinion, this company can create very interesting new products.

Consumer innovativeness: (Tellis et al., 2009)

- (1) I like being exposed to new ideas. (*Openness-Stimulus variation*)
- (2) I hate any change in my routines and habits. (r) (*Openness-Habituation*)
- (3) I constantly find new ways of living to improve over my past ways. (*Openness-Variety seeking*)
- (4) I enjoy the novelty of owning new products. (*Enthusiasm-Noveltly seeking*)
- (5) Purchasing new products takes too much time and effort. (r) (*Reluctance-Effort*)
- (6) I relish the gamble involved in buying new products. (*Enthusiasm-Risk taking*)
- (7) New products are getting shoddier and shoddier. (r) (*Reluctance-Nostalgia*)
- (8) Others often ask me for advice about new products. (*Enthusiasm-Opinion leadership*)
- (9) Many new products allow firms or governments to spy on individuals. (r) (*Reluctance-Suspicion*)
- (10) New products have an unacceptably high price. (r) (*Reluctance-Frugality*)

