# Online consumers' reactions to price decreases: Amazon's Kindle 2 case

Kyung Young Lee
*Williams School of Business, Bishop's University, Lenoxville, Canada*
Ying Jin
*Marketing Group, PSK Inc., Hwaseong, Korea, and*
Cheul Rhee and Sung-Byung Yang
*School of Business, Ajou University, Suwon, Korea*

Received 13 April 2014
Revised 12 October 2014
13 May 2015
7 June 2015
9 June 2015
Accepted 11 June 2015

## Abstract

**Purpose** – The purpose of this paper is to investigate how consumers respond to price changes by analyzing online product reviews (OPRs) posted on a product (Amazon's Kindle 2), and to suggest several future research topics on online consumers' reactions embedded in OPRs.

**Design/methodology/approach** – An exploratory case study is conducted using OPRs added to the Kindle 2. By analyzing 6,714 OPRs, the authors examine how online consumers respond to two continual price decreases embedded in the observable (star rating and review depth) and implicit (positive and negative emotions) features of OPRs as well as how the number of OPRs per day has changed after two price drops.

**Findings** – The authors found that all four features of OPRs (star rating, review depth, positive emotion, and negative emotion) and the number of OPRs per day had significantly changed after two price decreases for both long-term and short-term periods. In addition, online consumers' reactions to price decreases in terms of these four features and the change in the number of OPRs per day were different between the first and the second price drops.

**Research limitations/implications** – This study investigates online consumers' reactions to price decreases only. Future research should investigate other cases where price changes under the dynamic pricing strategy in order to find the relationship between price increases/decreases and consumers' reactions.

**Practical implications** – This study implies that online merchants should consider consumer groups' innovation adoption stages and make strategic decisions for price decreases to improve the sales of their products.

**Originality/value** – While prior research involving the effects of price changes on consumers' reactions has focussed on offline consumers, this is among the first attempts to address the long- and short-term reactions to price changes in terms of both the observable and implicit features of OPRs, and suggests that consumers' reactions to price changes in OPRs are more complex.

**Keywords** Innovation diffusion theory, Online product review, Electronic word-of-mouth, Consumers' reaction, Positive and negative emotion, Price decrease

**Paper type** Research paper

## 1. Introduction

As online shopping has become a regular part of our lives, online product reviews (OPRs), which form a collaborative social recommendation system for potential consumers, play a critical role during the decision-making process of online consumers (Cheung *et al.*, 2008). Compared with traditional store shopping, consumers who plan to shop online rely on OPRs as a major information source for evaluating and purchasing products or services (Ghose and Ipeirotis, 2011; Hsu *et al.*, 2013; Jalilvand and Samiei, 2012). Besides, OPRs can also be a communication channel among (potential)

Internet Research
Vol. 26 No. 4, 2016
pp. 1001-1026

1066-2243
DOI 10.1108/IntR-04-2014-0097

consumers, so that consumers share knowledge about the products they purchased online (Chen and Xie, 2008; Lee *et al.*, 2006). Therefore, managing OPRs has become of utmost importance for online merchants as more and more online consumers depend on them (Bigne-Alcaniz *et al.*, 2008). Prior research on OPRs has provided valuable insights by identifying electronic word-of-mouth (e-WOM) as a potential driver of consumers' behavior (e.g. Harrison-Walker, 2001), as well as by examining the diverse features of OPRs (i.e. star rating, review depth, positive or negative emotion, etc.) that influence review helpfulness (e.g. Mudambi and Schuff, 2010), which in turn, leads not only to helping consumers make smarter decisions, but also to influencing the sales of products or services sold online (Dellarocas *et al.*, 2007).

Among several factors that influence consumers' behavior, it is price that eventually determines the purchase of a specific product (Lichtenstein *et al.*, 1993). Hence, it is important for retailers to predict consumers' reactions when changing prices. Of particular interest to both practitioners and academics has been whether price changes influence consumer reactions (e.g. attitudes, intentions, or behaviors). Accordingly, the previous literature has revealed various sources of evidence regarding the influence of price changes on consumers' reactions in diverse settings (e.g. Dall'Olmo Riley *et al.*, 2013; Epstein *et al.*, 2012; Hardie *et al.*, 1993; Yuan and Han, 2011). Although they have provided quite a few implications for the dynamics of consumers' reactions to price changes, most of them have been conducted in traditional store shopping environments. Even those studies conducted in the context of online shopping (e.g. Moon *et al.*, 2008) have been limited to analyzing the direct relationship between price changes and one or a few consumer response-related variables (e.g. intentions or behaviors), using experimental or survey data with individuals as the units of analysis. Thus, so far, little effort has been made to investigate how online consumers' reactions to price changes are expressed in OPRs. Due to the openness of OPRs to the public and their spontaneous reactions to market price changes, OPRs can serve as more up-to-date information for both online consumers (or even traditional consumers) and online merchants. Therefore, an in-depth analysis of consumers' reactions to price changes expressed in OPRs can provide both academia and practice with valuable implications.

The purpose of this study is to take an in-depth look at the case of Amazon Kindle 2, to examine consumers' reactions to the series of price changes, and eventually to provide several potential research topics for future research. That is, this paper analyzes consumers' reactions embedded in the four features of OPRs on Amazon's Kindle 2 (i.e. star rating, review depth, positive emotion, and negative emotion) in addition to the number of OPRs per day and proposes several future research topics based on the discussion of the finding results. More specifically, we divide our data set into three groups by the two dates of price discounts and examine whether there are any significant differences in the degree of these four OPR features, as well as the number of OPRs per day across groups for a long period of time. In addition, we develop two-paired sets of 16 day before and after groups around the two dates of the price decreases, and compare the differences in those four OPR features, in addition to the number of OPRs per day, for a short period of time.

This paper unfolds as follows. In the next section, we introduce the relevant concept of OPRs and innovation adoption, and review the literature on the impact of price changes on consumers' reactions. Then, we present the research methodology and

results. Finally, we discuss the results to provide several future research topics, followed by the implications, along with the limitations of the study.

## 2. Theoretical background

### *2.1 The comparison of online and offline consumers' reactions and behaviors*

A number of extant studies have investigated the difference between online and offline consumers' reactions and behaviors. Penz and Hogg (2011) found that pleasure and emotional arousal are higher in the online shopping context, while perceived ambivalence (i.e. the existence of both positive and negative emotion at the same time) is higher in the offline context. They also found that online consumers find shopping more complex than offline consumers and perceive higher level of product performance risk, but offline consumers show higher level of product involvement than online consumers. Zhang and Wedel (2009) compared the effectiveness of customized promotions in online and offline shopping contexts and found that loyalty promotions are more profitable in online stores than offline stores, and for promotion-sensitive product categories, individual-level customized promotions can lead to a more profit increase in online stores than offline stores, which implies that online consumers are more responsive to individually tailored promotion effort than offline customers. Degeratu *et al.* (2000) found that in the supermarket context, price sensitivity of consumers is higher online, but the combined effect of price and promotion on choice of a certain supermarket is weaker online than offline. Cho *et al.* (2002) investigated the post-purchase evaluation of online and offline consumers and found that online consumers are more likely to complain for the same level of benefit and less likely to complain for the same level of cost than offline customers and that online consumers expressed higher propensity to complain if there are delayed responses by the seller than offline consumers.

These studies clearly show that there are differences between online and offline consumers in terms of emotional reactions, product involvement, perceived shopping complexity, response to the sellers' promotional effort, price sensitivity, post-purchase evaluation, and tendency to complain about their purchases. Although these studies have provided us with valuable insights about how consumers' cognitive/emotional reactions and behaviors in an online shopping environment differs from those in an offline shopping environment, little effort so far has been made to look into how online consumers' observable and implicit reactions embedded in OPRs evolve over time. Therefore, this study is intended to investigate how online consumers' reactions change over time and how those reactions are different from short- and long-term periods.

### *2.2 The impact of OPRs*

WOM is defined as "all informal communications directed at other consumers about the ownership, usage, or features of particular goods and services or their sellers" (Hu *et al.*, 2006, p. 324). Compared with traditional WOM, consumers who shop online rely increasingly on e-WOM (Chang *et al.*, 2013). e-WOM provides an open, flexible, diverse network environment, while traditional WOM is communicated mainly by face-to-face interactions. As online communication is prevalent on e-commerce sites, e-WOM's timeliness and generalization can successfully enhance the efficiency of a merchant's marketing strategy (Dellarocas *et al.*, 2007). Currently, as consumer-generated product reviews have proliferated on e-commerce sites and have significantly affected consumers' purchase decisions, it is necessary for online retailers to manage OPRs properly (Ghose and Ipeirotis, 2011). A review of prior research on e-WOM provides

insightful suggestions on how OPRs are used by online consumers to express their opinions about products purchased online, as a collaborative communication channel among consumers (Dellarocas *et al.*, 2007). OPRs are created by and communicated among consumers, based on their personal usage experience, which can serve as an important reference for potential buyers. Thus, we often consider consumer-generated OPRs as e-WOM communications. Unlike traditional WOM, OPRs are overtly shown to the public and posted on many e-commerce sites, so that anyone interested in the product can contribute to and review them. As such, it is easier for consumers to access OPRs and adopt (contribute) useful information from (to) them than traditional WOM. Thus, the way online consumers react to price changes in OPRs should be different from that in traditional shopping environments.

OPRs play a crucial role for merchants. For example, Dellarocas *et al.* (2007) showed that the metrics of online reviewer demographics can be useful indicators of a product's demand across different consumer segments. Chen and Xie (2008) investigated the impacts of seller-created product attribute and buyer-created review information on product sales. Moreover, Hu *et al.* (2014) found that review ratings do not influence sales directly, but indirectly impact through sentiments. OPRs are also helpful for consumers by providing valuable information to other shoppers interested in purchasing a specific product. Prior literature has suggested that the diverse features of an OPR can influence consumers' purchase decisions. For example, the valence (i.e. intrinsic emotional attractiveness and aversiveness) and volume (i.e. review depth) (Chevalier and Mayzlin, 2006; Yin *et al.*, 2014), star-rating extremeness and review depth (Mudambi and Schuff, 2010), reviewer ranking and negative words (Baek *et al.*, 2012), readability and number of reviews (Ghose and Ipeirotis, 2011) are found to impact review helpfulness, which in turn, influences purchase decisions. In this study, among six features of OPRs introduced in extant studies (i.e. emotions (valence or negative words), volume (review depth), star rating (extremeness), number of reviews, reviewer ranking, and readability), we investigate four selected features of OPRs (i.e. review depth, star rating, emotions, and number of reviews) as online customers' reactions to the price change, since these four can represent various aspects of online consumers' reactions in terms of individuals' level of engagement in an OPR (review depth), their level of preference to the product itself (star rating), their level of valence toward products and price changes (positive or negative emotions), and the number of OPR participations (number of reviews), while reviewer's ranking and readability of OPRs may not necessarily be considered to be the reactions toward price changes.

### *2.3 The impact of price changes on consumers' reactions*

Price is one of the most important purchase criteria for offline consumers (Lichtenstein *et al.*, 1993). In addition, in e-commerce environments, price is considered as an important criterion for consumers' decision making for purchasing products online (Chung, 2013; Jiang, 2002). Therefore, merchants should predict consumers' reactions when they plan to set or change prices. Table I presents a summary of the literature on the impacts of price changes on consumers' reactions. As shown in Table I, a number of previous studies have explored the relationship between price changes and consumers' reactions in diverse settings.

According to previous studies, price changes (price increases or decreases) have significant impacts on consumers' attitudes (e.g. Hardie *et al.*, 1993; Kachersky, 2011; Mazumdar and Jun, 1993), intentions (e.g. Dall'Olmo Riley *et al.*, 2013; Moon *et al.*, 2008; Teng, 2009), behaviors (e.g. Faruqui and George, 2005; Kalwani *et al.*, 1990; Yuan and

| Author(s) | Method | Sample size (time) | Sample source | Independent variable | Dependent variable | Findings |
|---|---|---|---|---|---|---|
| Barone and Roy (2010) | Experiment | 80 | Administrative employees of a Midwestern univ. | Price decrease | Consumers' responsiveness to targeted discount | Consumers evaluate targeted price promotions more favorably than inclusive offers |
| Dall'Olmo Riley *et al.* (2013) | Experiment | 50 | UK univ. students | Price decrease | Purchase intention, brand emotion | The distance between brands and their extension increases when prestige brands offer a discount |
| Faruqui and George (2005) | Experiment | 2,500 (July 2003-December 2004) | Consumers in California | Price decrease | Energy use | Consumers conclusively reduced peak-period energy use in reaction to a time-varying price decrease |
| Hardie *et al.* (1993) | Experiment | 200 (January 1983-July 1985) | Orange juice purchases in Marion | Price decrease | Brand choice and product attitude | Consumers pay more attention to price loss than gain when they are faced with a brand choice situation |
| Heussler *et al.* (2009) | Experiment | 210 | Business univ. students | Price increase | Emotions | When price increases, positive emotions have a greater impact on price fairness than do negative emotions |
| Homburg *et al.* (2005) | Experiment | 80 | Marketing class at a major German univ. students | Price increase | Customer satisfaction | Satisfaction moderates the relationship between consumers' emotion valence and perceived motive fairness |
| Kachersky (2011) | Experiment | 155 | US consumers | Price increase | Brand attitude | Total price increases make consumers form less favorable attitudes toward retailers and product brands |
| Kalwani *et al.* (1990) | Panel | 13,218 (February 15, 1979-May 15, 1980) | Coffee purchases from 4 Kansas cities | Price increase, price decrease | Consumer brand choice | Price loss is greater than price gain, implying a market reaction |
| Low *et al.* (2013) | Survey | 248 | Customers of two retail stores | Price increase, price decrease | Satisfaction | Economic satisfaction is negatively associated with price sensitivity, while social satisfaction is positively related to price sensitivity |

(*continued*)

**Table I.**
Summary of the literature on the impacts of price changes on consumers' reactions

Table I.

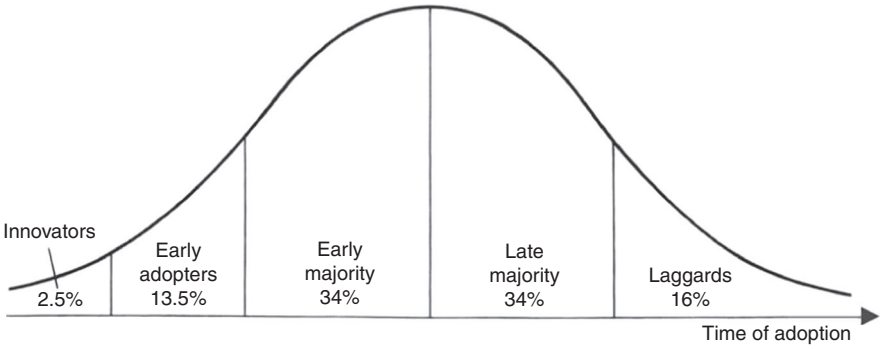
| Author(s) | Method | Sample size (time) | Sample source | Independent variable | Dependent variable | Findings |
|---|---|---|---|---|---|---|
| Mazumdar and Jun (1993) | Experiment | 250 | Undergraduate business students | Price increase, price decrease | Purchase attitude | Multiple price increases are evaluated more unfavorably than a single price increase |
| Moon *et al.* (2008) | Experiment | 116 | New Zealand business undergraduate students | Price increase | Purchase intention | Price does not significantly affect consumer purchase intentions |
| Raghubir *et al.* (2004) | Conceptual study | – | – | Price increase, price decrease | Consumer evaluation | Price decline has an influence on the information effect |
| Rotemberg (2005) | Economic model | – | – | Price increase | Purchase behavior | Consumers react negatively only if they become convinced that prices are unfair |
| Sudhir (2001) | Secondary data | – | US auto market | Price decrease | Competitors' behavior | A price cut in increasing demand is critically related to competitors' reaction to the price change and this reaction is different by different market segments |
| Teng (2009) | Survey | 117 | Consumers in 11 fast-food restaurants | Price decrease | Consumers' attitudes and purchase intentions | Regardless of whether demand reaches the lowest point, a price decrease still influences consumers' attitudes and purchase intentions |
| Yuan and Han (2011) | Experiment survey | 20 | Undergraduate students | Price increase, price decrease | Search behavior | Price changes influence consumers' searching behavior |

Han, 2011), satisfaction (e.g. Homburg *et al.*, 2005; Low *et al.*, 2013), and evaluations (e.g. Raghubir *et al.*, 2004). Although these studies have provided valuable insights into the dynamics of consumer reactions to price changes, most of them were conducted at the individual level in the context of offline or traditional shopping environments (where consumers' reactions are not overtly shown to the public), along with experimental or survey data. As such, our literature review shows that, in spite of the practical and theoretical importance of OPRs (another useful way for consumers to react to price changes), little effort has been made to examine consumers' reactions expressed in OPRs. Therefore, it is necessary to explore how consumers react to price changes over time in the context of online shopping at the review (OPR) or day (not individual) level, by analyzing both observable and implicit reactions shown in OPRs after price changes.

Thus, in this study, we explore the relationship between price changes (i.e. two price decreases) and the changes in OPR features (i.e. star rating, review depth, positive emotion, negative emotion, and the number of OPRs per day) as different types of consumers' reactions, using the OPRs of Kindle 2 on Amazon.com. That is, we choose to investigate how those five consumers' reactions embedded in OPRs vary during the two price changes, because they are found to influence the helpfulness rating of OPRs (Mudambi and Schuff, 2010) and even consumers' intention to purchase a product in e-commerce environments (Lee *et al.*, 2013). As this research is a data-driven exploratory case study, we do not intend to provide detailed theory-based hypotheses. Rather, based on a single case study with OPRs on Kindle 2 and theoretical perspectives of innovation diffusion theory (IDT) (Rogers, 1962), we provide four-specific future research topics in the Discussion section.

### *2.4 Early and late adopters of innovation*

IDT (Rogers, 1962) classified the consumers (adopters) into five groups by their stage of innovation adoption: innovators, early adopters, early majorities, late majorities, and laggards in his product innovation adoption curve, shown in Figure 1. The first group, innovators are people who adopt a certain innovation at the earliest stage. They are a small group of people who have financial liquidity and are ready to adopt an innovation just because it is new. They are also willing to take a risk that the technology they adopt could fail. Overall, they are not very price sensitive. Second, early adopters are opinion leaders who also have financial liquidity, but they are socially forward, so that




**Source:** Rogers (1962)

**Figure 1.**
The innovation adoption curve

they like to communicate their experience about their adoption with others. Third, rather than creating public opinions about an innovation, early majorities listen to early adopters' opinions. They are the majority in the first half of the product life cycle (see Figure 1). Fourth, late majorities adopt an innovation right after the average users. They are price sensitive and have less financial liquidity than earlier groups. Also, they are well connected to opinion leaders (early adopter and early majority groups), so that they tend to watch the price and others' opinions, and think twice before they actually make a purchase. Finally, laggards are the last to adopt an innovation and they are seldom connected to opinion leaders. They also tend not to add any comments online (they tend to be older than other groups). In sum, the first half of consumers is composed of innovators, early adopters, and early majorities, while the second half of them consists of late majorities and laggards.

If we apply this classification to the case of Kindle 2, the first price change might have happened around the time when the early portion of late majorities started to purchase the product and the second price change might have happened around the last portion of late majorities or laggards started to purchase the product. Since this study is intended to take an in-depth look into a case with two continual price changes and interpret the phenomena regarding consumers' reactions to those price changes embedded in OPRs, we use this theoretical perspective of IDT to interpret the phenomena we found from our investigation of Kindle 2.

## 3. Research methodology

### *3.1 Research design*

In order to investigate consumers' reactions to the two continual price decreases in the context of online shopping, we conduct an exploratory case study, focussing on Kindle 2 reviews on Amazon.com. We choose OPRs on Amazon.com because only Amazon.com account members who have successfully purchased on the website can post reviews, and they are allowed to write only one review on the purchased item[1], which means that the OPRs on Amazon.com are true e-WOM of the customers who have actually bought the product. Moreover, Kindle 2 is one of the representative products produced by Amazon, and mainly sells on Amazon.com.

We design our research as a case study, following Baxter and Jack's (2008) recommendation. According to Baxter and Jack (2008, p. 545), a case study design should be considered "when the focus of the study is to answer how and why questions; we cannot manipulate the behavior of those involved in the study; we want to cover contextual conditions because we believe they are relevant to the phenomenon under study; or the boundaries are not clear between the phenomenon and context." Since the focus of this study is to answer how consumers react to price decreases, we cannot manipulate reviewers' behavior, we want to cover the contextual conditions when price decreases, and the boundary between the phenomenon and the context is not clear, an exploratory case study is well-suited for our research purposes.

Moreover, we choose to conduct a single case study, following Dubé and Paré's (2003) suggestion, a single case study is most favorable when the case represents a substantively significant case, a critical case, an extreme or unique situation; or a revelatory case. Since the Kindle 2 is one of the representative and leading products of Amazon.com and its price was reduced twice during the eight months of its product lifecycle, it can be considered as the most significant, critical, and best-suited case for this study. Amazon's Kindle 2 was first released on February 23, 2009 and stopped selling on October 22, 2009. During the exact eight months of its public sales period,

Amazon first reduced the Kindle 2's price from the original $359 to $299 on July 8, 2009, and further reduced its price to $259 on October 7, 2009[2].

Our eight-month data set is divided into three groups by the two dates of price discount for the test of Study 1: Groups 1, 2, and 3. In addition, the two-paired sets of 16 day[3] before and after groups around the two dates of the price decreases are also developed for the test of Study 2: Groups A and B; and Groups C and D. Furthermore, groups composed of days, which are the units of analysis of Study 3, are additionally developed by summing up the frequencies of reviews per day for the test of Study 3: Groups 4, 5, and 6; and Groups E, F, G, and H.

To explore consumers' reactions to the two continual price decreases in terms of the four OPR features (star rating, review depth, positive emotion, and negative emotion) and the number of OPRs per day, we design three studies. First, Study 1 examines whether there are significant differences in the degree of the four OPR features among Groups 1, 2, and 3 for the long term, using ANOVA and Duncan tests. Second, Study 2 compares the statistical differences of the four OPR features between the before and the after groups (Groups A and B; and Groups C and D) for the short term, conducting independent-samples *t*-tests. Finally, Study 3 validates whether there are any significant differences in the number of OPRs per day across groups (Groups 4, 5, and 6) for the long term and compares the statistical differences of the number of OPRs per day between the before and the after groups (Groups E and F; and Groups G and H) for the short term, performing ANOVA and Duncan tests, as well as independent-samples *t*-tests. It should be noted that the units of analysis in Studies 1 and 2 are OPRs, while those in Study 3 are days. In sum, our data collection and analysis procedure are illustrated in Figure 2.

### *3.2 Data collection and measurement*

We collected our data set containing a total of 6,714 OPRs of the Kindle 2 on Amazon.com over a period of eight months (from February 23, 2009 to October 22, 2009), using web-mining methods. First, we used a web crawler to download the web pages containing the Kindle 2's OPRs from Amazon.com. Then, we wrote a Java code to parse each web page and extract the meaningful parts of the OPRs. For each review, we extracted the following data: star rating; the date of the review written; and the textual review content[4].

To measure the OPR features, first, star rating was identified from a web crawler. Then, since the large volume of reviews made it impractical to manually conduct a content analysis, we used a text-mining software program, Linguistic Inquiry and Word Count (LIWC) (Pennebaker *et al.*, 2007) to measure review depth and the implicit features (positive emotion and negative emotion) of OPRs. The validity of LIWC has been verified by quite a few prior studies that adopted this methodology in measuring psychological status embedded in e-WOM, including blogs (Cohn *et al.*, 2004) and online reviews (Ludwig *et al.*, 2013). In addition, in order to validate the reliability and accuracy of LIWC in measuring positive and negative emotions, we conducted a manual coding[5] using randomly selected five percent of OPRs (336 out of 6,714 reviews) and compared the results with those generated by the LIWC approach. The Pearson correlation coefficients were 0.75 and 0.80, respectively, the LIWC approach was confirmed to provide reliable and correct results in measuring positive and negative emotions. Finally, the number of OPRs per day was calculated by summing up the numbers of reviews per day, performing SQL queries in Microsoft SQL Server 2008 R2. The variables and measurements used in the study are shown in Table II.

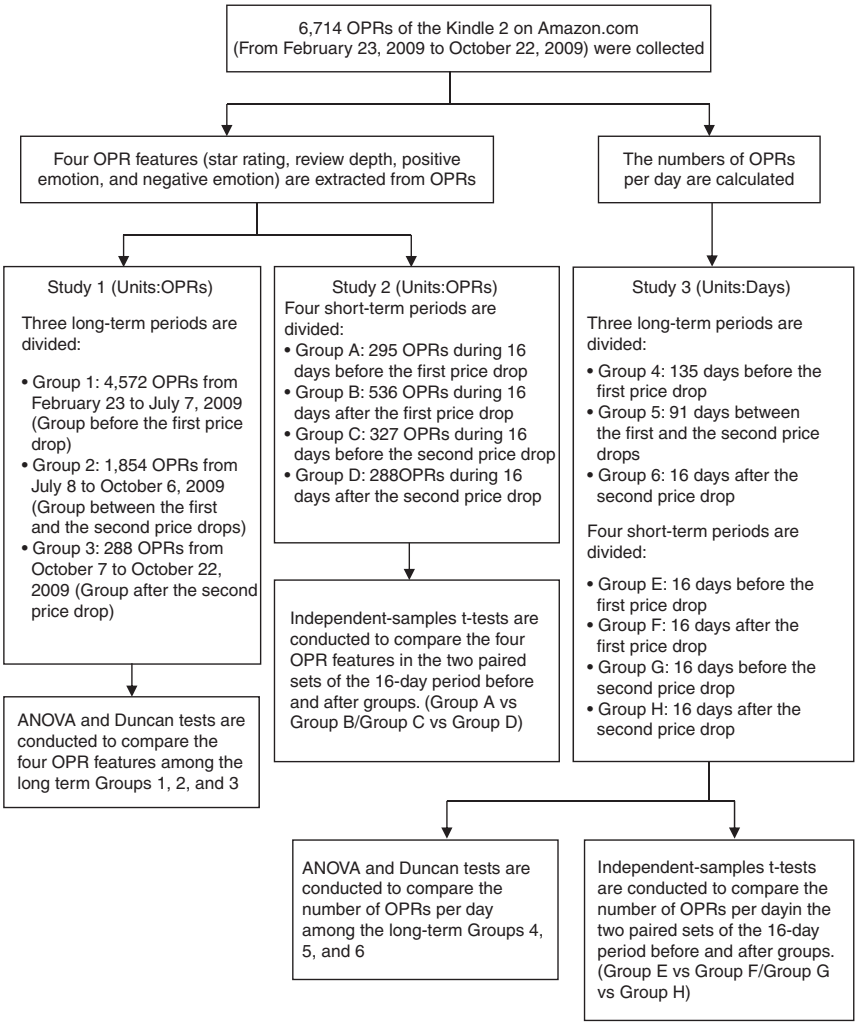



**Figure 2.**
The procedure of data analysis

## 4. Data analysis and results

### *4.1 Study 1: the long-term reactions to price decreases on the four OPR features*

To examine whether there are significant differences in the degree of four OPR features (star rating, review depth, positive emotion, and negative emotion) among Groups 1, 2, and 3, we conducted ANOVA and Duncan tests. The results are presented in Table III.

Based on the results of Study 1, all four of the OPR features were found to be significantly different across groups. To be more specific, after the first attempt at a price discount, the degree of star rating and review depth decreased significantly, while negative emotion increased significantly. However, positive emotion did not significantly change. Overall, consumers' long-term reactions represented in OPRs toward the first price decrease are negative (i.e. significant decreases in star rating and review depth and a significant increase in negative emotion). After the second

| Variables | Operational definition | Measurement | Reference |
|---|---|---|---|
| Star rating | Consumers' evaluation on the product's quality in an OPR, indicating their responses toward the purchased product | Numerical star rating, ranging from 1 to 5 (Amazon.com) | Krosnick *et al.* (1993), Mudambi and Schuff (2010) |
| Review depth | Total word counts of an OPR, based on the assumption that longer reviews contain more information | No. of total words (LIWC) | Ghose and Ipeirotis (2011), Mudambi and Schuff (2010) |
| Positive emotion | Positive word percentage in an OPR | No. of positive emotion word/no. of total words (LIWC) | Forman *et al.* (2008), Ghose and Ipeirotis (2011) |
| Negative emotion | Negative word percentage in an OPR | No. of negative emotion word/no. of total words (LIWC) | Forman *et al.* (2008), Ghose and Ipeirotis (2011) |
| The number of reviews per day | The total frequency of OPRs for each day | No. of total counts of reviews on a daily basis | Ghose and Ipeirotis (2011) |

**Table II.**
Variables and measurement

| Variables | Group 1[a] ($n = 4{,}572$) | Group 2[b] ($n = 1{,}854$) | Group 3[c] ($n = 288$) |
|---|---|---|---|
| *Star rating* | | | |
| Mean | 4.21 | 3.51 | 4.23 |
| SD | 1.321 | 1.777 | 1.290 |
| ANOVA | $F$ (26, 711) = 125.653*** | | |
| Duncan | Group 1 > Group 2 ($p < 0.05$); Group 2 < Group 3 ($p < 0.05$) | | |
| *Review depth* | | | |
| Mean | 164.64 | 141.96 | 132.58 |
| SD | 192.396 | 154.953 | 189.301 |
| ANOVA | $F$ (26, 711) = 12.850*** | | |
| Duncan | Group 1 > Group 2 ($p < 0.05$); Group 2 = Group 3 | | |
| *Positive emotion* | | | |
| Mean | 5.26 | 5.01 | 5.56 |
| SD | 3.102 | 2.957 | 2.964 |
| ANOVA | $F$ (26, 711) = 6.332** | | |
| Duncan | Group 1 = Group 2; Group 2 < Group 3 ($p < 0.05$) | | |
| *Negative emotion* | | | |
| Mean | 0.95 | 1.09 | 0.92 |
| SD | 1.199 | 1.460 | 1.167 |
| ANOVA | $F$ (26, 711) = 8.901*** | | |
| Duncan | Group 1 < Group 2 ($p < 0.05$); Group 2 > Group 3 ($p < 0.05$) | | |

**Notes:** [a]Group with original price, consisting of 4,572 OPRs from February 23 to July 7, 2009; [b]group with the first price decrease, consisting of 1,854 OPRs from July 8 to October 6, 2009; [c]group with the second price decrease, consisting of 288 OPRs from October 7 to October 22, 2009. **$p < 0.01$; ***$p < 0.001$ (two-tailed)

**Table III.**
Results of ANOVA and Duncan tests in Study 1

price decrease, on the other hand, both star rating and positive emotion increased significantly, while negative emotion was found to be significantly reduced. However, review depth did not significantly change. In sum, overall consumers' long-term reactions to the second price decrease are positive.

*4.2 Study 2: the short-term reactions to price decreases on the four OPR features*

To explore the statistical differences of four OPR features between the right before and the right after price decrease groups (Groups A and B; and Groups C and D), data collected 16 days before and after the two price decreases were analyzed using independent-samples *t*-tests. The results are shown in Table IV.

As shown in Table IV, just after the first price decrease (from \$359 to \$299), three out of the four OPR features were found to change significantly. More specifically, the degree of star rating and positive emotion significantly decreased, while negative emotion significantly increased, which is similar to the long-term change in reactions shown in Study 1. However, review depth did not change significantly, which is different from the results in Study 1. Immediately after the second price decrease (from \$299 to \$259), on the other hand, none of the four OPR features changed significantly. In sum, the results of Study 2 imply that the reaction to an additional price drop becomes weaker.

*4.3 Study 3: the long- and short-term reactions to price decreases on the number of OPRs per day*

In Study 3, in order to investigate the changes in the number of OPRs per day, we additionally explored the statistical differences among the three groups, divided by the two price discount dates (Groups 4, 5, and 6), as well as the two-paired sets of the

| Variables | Group A[a] ($n = 295$) | Group B[b] ($n = 536$) | Group C[c] ($n = 327$) | Group D[d] ($n = 288$) |
|---|---|---|---|---|
| *Star rating* | | | | |
| Mean | 4.28 | 2.40 | 4.35 | 4.23 |
| SD | 1.275 | 1.787 | 1.222 | 1.290 |
| Levene's[e] | $F = 222.150$*** | | $F = 1.952$ | |
| *t* | $t = 17.623$*** | | $t = 1.205$ | |
| *Review depth* | | | | |
| Mean | 133.51 | 119.68 | 157.31 | 132.58 |
| SD | 133.506 | 119.163 | 179.925 | 189.301 |
| Levene's | $F = 1.844$ | | $F = 1.146$ | |
| *t* | $t = 1.533$ | | $t = 1.660$ | |
| *Positive emotion* | | | | |
| Mean | 5.39 | 4.62 | 5.10 | 5.56 |
| SD | 3.037 | 2.605 | 2.995 | 2.964 |
| Levene's | $F = 2.511$ | | $F = 0.382$ | |
| *t* | $t = 3.824$*** | | $t = -1.900$ | |
| *Negative emotion* | | | | |
| Mean | 0.97 | 1.28 | 0.92 | 0.92 |
| SD | 1.223 | 1.707 | 1.094 | 1.167 |
| Levene's | $F = 16.464$*** | | $F = 1.186$ | |
| *t* | $t = -2.958$** | | $t = 0.004$ | |

**Notes:** [a]Group with 16 days before the first price decrease, consisting of 295 OPRs from June 22 to July 7, 2009; [b]group with 16 days after the first price decrease, consisting of 536 OPRs from July 8 to July 23, 2009; [c]group with 16 days before the second price decrease, consisting of 327 OPRs from September 21 to October 6, 2009; [d]group with 16 days after the second price decrease, consisting of 288 OPRs from October 7 to October 22, 2009; [e]the result of Levene's test for homogeneity (equality) of variances. **$p < 0.01$; ***$p < 0.001$ (two-tailed)

**Table IV.**
Results of independent-samples *t*-tests in Study 2

16-day period before and after groups (Groups E and F; and Groups G and H), performing ANOVA/Duncan tests and independent-samples *t*-tests, respectively. Figure 3 presents the daily trends of the number of OPRs and groups analyzed in Study 3. The results of Study 3 are presented in Tables V and VI.

According to Tables V and VI, after the first price drop, the number of OPRs per day was found to significantly decrease in the long term (comparison between Groups 4 and 5 in Table V), while in the short term (immediately after the first price drop), the number of OPRs drastically increased (comparison between Groups E and F in Table VI). The changes in reactions to the second price discount on the number of OPRs per day were not found to be significant in either the long- or short-term perspectives. The number of OPRs per day reflects online consumers' willingness to participate in posting their opinions about the focal product.

## 5. Discussion

The goal of this study is to observe and interpret how online consumers react to continual price changes of a product over its entire product life cycle expressed in the features of OPRs, and eventually to propose several future research topics on the role of price changes in consumers' reactions embedded in OPRs. Following the exploratory case study approach, we chose the OPRs of Amazon's Kindle 2 and designed three separate studies in order to investigate the reactions to price decreases embedded in the observable (star rating and review depth) and implicit (positive emotion and negative emotion) OPR features, as well as the number of OPRs per day. Then, based on theoretical perspectives of IDT and the literature on the price impact on consumers' reactions, we provide interpretation of the Kindle 2 case, followed by several future research topics.

### *5.1 Discussion on Study 1: long-term changes in star rating, review depth, and emotions*

Concerning Study 1 (long-term change in star rating, review depth, and positive and negative emotions), we found that, after the first price drop, the degree of star rating and review depth significantly decreased, while negative emotion significantly increased. However, after the second price drop, both star rating and positive emotion increased significantly, while negative emotion was found significantly reduced. Such changes in customers' reactions can be interpreted with innovation adoption stages of customers (Rogers, 1962). If we take a close look at Figure 3, the period between the release of Kindle 2 and the first price drop covers more than half (135 days) of its entire product life cycle (242 days in total), so that in the five innovation adoption stages suggested by Rogers (1962), we can assume that the first price change happened around the period when the early portion of late majorities started to purchase the product. Thus, the OPRs in the Group 1 period (between the release of the product and the first price drop) were contributed by innovators, early adopters, mostly early majorities, and maybe some early portion of late majorities, while the OPRs in Group 2 (between the first and the second price drops) were contributed by mostly late majorities, and those in Group 3 by both late majorities and laggards. These innovation adoption stages of customers may help interpret the significant changes of some OPR features in the following ways. Extant research has found that there are differences in product involvement, usage variety, and price sensitivity between early and late adopter groups (Goldsmith and Newell, 1997; Ram and Jung, 1994; Rogers, 1962; Tellis, 1988). According to these studies, early adopter groups (i.e. innovators, early adopters, and early majorities) are found to be less price sensitive, more involved in the focal

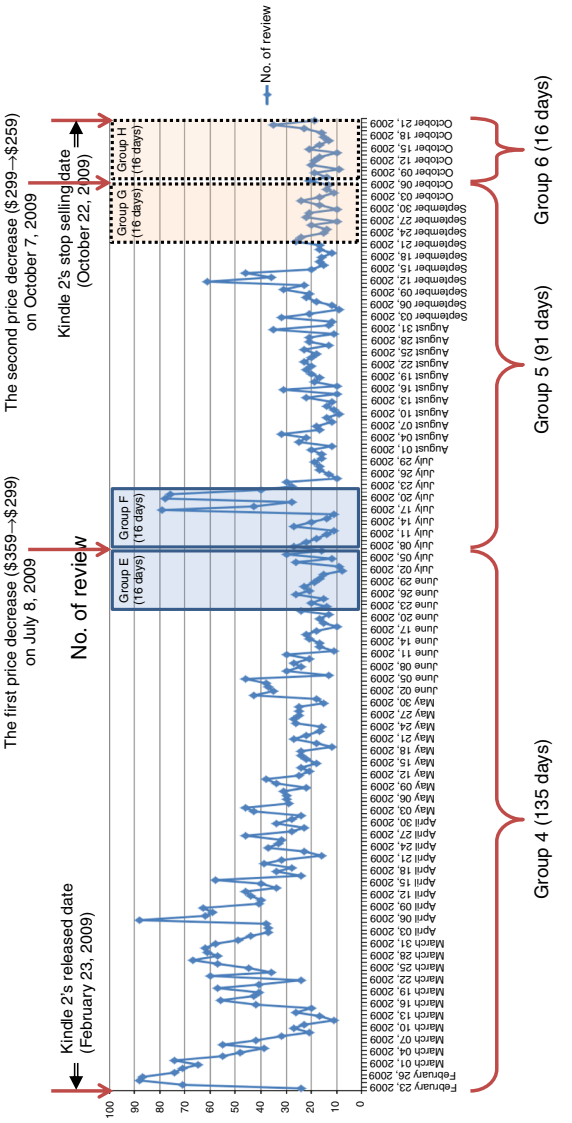



**Figure 3.**
Daily trends of the number of reviews and groups analyzed in Study 3

product, and have a higher level of usage variety than late adopter groups (i.e. later majorities and laggards). Other studies have found that early adopter groups tend to derive positive emotions from the novelty of a product, while late adopter groups usually experience negative emotions and skepticism toward a product (Moore, 1991; Rindovaand Petkova, 2007). In addition, early adopter groups are found to be more willing to express their opinions than late adopter groups (Rogers, 1962). Such theoretical perspectives are actually consistent with our findings from the Kindle 2 case.

Star rating decreased over a long-term period between Groups 1 and 2. In addition, the change directions of positive and negative emotions are similar to that of star rating. The significant long-term decrease in star rating can be explained by the differences in attitude and emotions toward an innovative product between early adopter groups and late adopter groups. Prior research suggests that early adopter groups are less skeptical about a product and ready to appreciate the novelty of new innovation and tend to have positive emotions toward the product than late adopter groups (Moore, 1991; Rindovaand Petkova, 2007; Rogers, 1962). It is also found that consumers with high-product involvement (i.e. early adopter groups) tend to show greater satisfaction with the product than low-involvement consumers (i.e. late adopter groups) (Richins and Bloch, 1991). Therefore, early adopter groups tend to give higher star ratings and show less negative emotions in their OPRs than late adopter groups, so that the long-term changes of consumers' reactions embedded in OPRs between Groups 1 and 2 become negative with decreased star ratings and increased negative emotions.

| Variable | Group 4[a] ($n = 135$) | Group 5[b] ($n = 91$) | Group 6[c] ($n = 16$) |
|---|---|---|---|
| *Number of reviews per day* | | | |
| Mean | 33.87 | 21.73 | 18.00 |
| SD | 17.706 | 13.590 | 6.000 |
| ANOVA | | $F$ (2,239) = 19.820*** | |
| Duncan | | Group 4 > Group 5 ($p < 0.05$); Group 5 = Group 6 | |

**Notes:** [a]Group with original price, consisting of 135 days with the number of OPRs per day from February 23 to July 7, 2009; [b]group with the first price decrease, consisting of 91 days with the number of OPRs per day from July 8 to October 6, 2009; [c]group with the second price decrease, consisting of 16 days with the number of OPRs per day from October 7 to October 22, 2009. ***$p < 0.001$ (two-tailed)

**Table V.** Results of ANOVA and Duncan tests for the number of reviews per day in Study 3

| Variable | Group E[a] ($n = 16$) | Group F[b] ($n = 16$) | Group G[c] ($n = 16$) | Group H[d] ($n = 16$) |
|---|---|---|---|---|
| *Number of reviews per day* | | | | |
| Mean | 18.44 | 33.50 | 17.19 | 18.00 |
| SD | 6.324 | 23.751 | 5.167 | 6.000 |
| Levene's | $F = 40.148$*** | | $F = 2.635$ | |
| $t$ | $t = -2.451$* | | $t = -0.410$ | |

**Notes:** [a]Group with 16 days before the first price decrease, consisting of 16 days with the number of OPRs per day from June 22 to July 7, 2009; [b]group with 16 days after the first price decrease, consisting of 16 days with the number of OPRs per day from July 8 to July 23, 2009; [c]group with 16 days before the second price decrease, consisting of 16 days with the number of OPRs per day from September 21 to October 6, 2009; [d]group with 16 days after the second price decrease, consisting of 16 days with the number of OPRs per day from October 7 to October 22, 2009. *$p < 0.05$; ***$p < 0.001$ (two-tailed)

**Table VI.** Results of independent-samples t-tests for the number of reviews per day in Study 3

On the other hand, over a long-term period between Groups 2 and 3, the overall negative reactions (i.e. lower star rating and increased negative emotions) in Group 2 are recovered in Group 3 with increased star rating and positive emotions as well as decreased negative emotions. This phenomenon can be explained by two perspectives. First, late majorities are very cautious about making purchases so that they can watch and wait for the change of price and others' opinions (Rogers, 1962). Thus, upon the second price drop, those late majorities and laggards who made purchases after the second price drop may have shown their price satisfaction in the Group 3 period. Second, the two continual price drops might have reduced overall expectations of the product by the consumers in this period. Besides, it is found that the price has a U-shaped relationship with consumer ratings, so that consumers give relatively higher ratings toward a product when the price is at the highest or lowest level, while lower ratings are given toward a product with a medium price range (Chen *et al.*, 2011). More specifically, Chen *et al.* (2011) argued that, for low-priced products, consumers give relatively higher ratings because they like to compliment the "good deal" from the product but, for high-priced products, consumers (especially early adopters) want to demonstrate their high-social status so that they afford to buy a product with a higher price, while for medium priced products, consumers become more practical and ready to relate product quality and their actual ratings. Therefore, after the second price drop, consumers' rating becomes positive since they want to tout the "good deal" from the two continual price drops.

Review depth also decreased over a long-term period between Groups 1 and 2. Such results can be explained by an extant finding that early adopter groups have a tendency to have higher usage variety (Rogers, 1962), so that these groups have more to say about the product than late adopter groups. In addition, early adopter groups are found to be highly motivated to spread the word to their peers (Subramani and Rajagopalan, 2003). With higher usage variety and motivation to share their experiences, early adopters and early majorities may use various aspects of the product, so that they are more willing to share their experiences and opinions about the product. On the other hand, review depth stays at the same level over a long-term period between Groups 2 and 3, since the same OPR participants (late majorities) have contributed to OPRs, so that their tendency to share their opinions did not change significantly before and after the second price drop.

Based on these observations and our interpretation with theoretical perspectives of IDT, a couple of future research topics can be suggested. First of all, for the long term, online consumers' reactions to a product embedded in OPRs can change over time and the change may not be linear, in that the reactions to the product in some cases become negative and in other cases, the reactions become positive. The triggers for the change in consumers' reaction could be various, including price changes and innovation adoption stages of customers. We initially interpret the long-term changes by comparing the characteristics of different groups in innovation adoption stages. In addition, we further observed that the reactions embedded in OPRs by different innovation adoption groups are related to price changes. However, due to the limited number of price changes in our case (i.e. two price drops in Kindle 2), the detailed relationships between price changes and consumers' reactions to a product embedded in OPRs according to the five-specific innovation adoption stages of customers (i.e. innovators, early adopters, early majorities, late majorities, and laggards) have not been found yet. Therefore, on top of our findings from this case study, investigation of the inter-relationship among price changes, the five different innovation adoption stages,

and post-purchase online reactions embedded in OPRs will provide valuable contributions to the body of knowledge on e-WOM literature.

Second, we can intuitively think that star rating is positively related with positive emotions and negatively related with negative emotions. Accordingly, we were able to observe similar directions of change between star rating and emotions. However, star rating is supposed to reflect overall quality of the product, while emotions are supposed to reflect affective reactions to the product and overall shopping experiences. We did observe that, although similar, the long-term changes in star rating and emotions are not always the same. For example, positive emotions stayed the same between Groups 1 and 2, while star rating decreased over the same period. Thus, it will be worthwhile to investigate topics on the relationships between star rating and emotional expressions embedded in OPRs, over five different innovation adoption stages.

*5.2 Discussion on Study 2: short-term changes in star rating, review depth, and emotions*

While the results of Study 1 (long-term change in OPR features) are interpreted mostly with the stages of innovation adoption (Rogers, 1962), the results of Study 2, the short-term changes right before and after the two price drops, should be interpreted with both the stages of innovation adoption and the price sensitivity of consumers. According to the innovation adoption curve (Figure 1) and our windows of short-term observation (Figure 3), the first price drop could have happened at the early stage of late majorities, while the second price drop could have happened in the middle of late majorities or between late majorities and laggards. Thus, the OPRs in both Groups A and B were contributed by mostly late majorities, while those in both Groups C and D were late majorities and laggards, respectively. According to extant studies, later majorities are skeptical toward innovation, price sensitive, and less willing to share their opinions and usually have lower usage variety (Ram and Jung, 1994; Rogers, 1962; Tellis, 1988). Again, these theoretical perspectives also help interpret consumers' reactions to those price changes for a short-term period (i.e. 16 days before and after each price drops).

For those 16 days before and after the first price drop, overall online consumers' reactions changed negatively with decreased star rating, decreased positive emotions, and increased negative emotions. Intuitively, we may think that price decreases are welcomed by consumers. Moreover, previous research has suggested that price discounts offer consumers economic benefits by removing financial barriers, which, in turn, arouse positive moods among consumers (Raghubir *et al.*, 2004). However, in the case of online e-commerce sites such as Amazon, OPRs are mostly written after individuals have made purchases and used the product for a while, so that OPRs are post-purchase and post-use opinions. In addition, there is a time lag between the time one consumer makes a purchase and gets to use a product and the time s/he posts an OPR. Therefore, after the first price drop, late majorities may become provocative, expressing disappointed feelings of economic loss since they have purchased the product at a higher price than the discounted one, resulting in negative reactions in OPRs, with negative star ratings and emotional expressions. For emotional reactions after the first price change, we can also interpret that those increased number of emotional expressions could have been due to the ripple effect (emotional contagion) (Barsade, 2002). That is, since OPR participants could read others' OPRs before they post their comments, their emotional reactions (including the positivity and negativity of their emotions) can be influenced by others' emotional comments. Review depth, however, did not change between Groups A and B since the same late majorities who

have a low tendency to share their experiences with others might have participated in OPRs (Rogers, 1962). Finally, for a short term before and after the second price drop (Groups C and D), none of the four OPR features (star rating, review depth, positive and negative emotions) have changed significantly since the effect of price changes diminishes over time.

Based on these observations, the following research topic can be suggested. We observed that, in the short term, online consumers' post-purchase reactions embedded in OPRs to the first price change are much stronger than those to the second price change. To the best of our knowledge, our finding is the first statistical finding that shows two different post-purchase reactions embedded in OPRs to the two continual price changes. However, our study is not intended to propose a causal model followed by statistical analyses with a set of independent and dependent variables, but a case study that shows online consumers' time-variant reactions to price changes. Therefore, based on the findings of this case study, empirical investigation of a causal relationship between the order of price changes and their impacts on consumers' reactions embedded in OPRs will provide ample implications for e-WOM discussions.

*5.3 Discussion on Study 3: long- and short-term changes in the number of OPRs per day*

We investigated the change in the number of OPRs per day to the two continual price changes, by comparing the three long-term groups (Groups 4, 5, and 6), as well as the two-paired sets of short-term groups (Groups E and F; and Groups G and H). Over a long-term period, the number of OPRs per day significantly decreased between Groups 4 and 5 (after the first price drop). This is due to the differences in willingness to share opinions between early adopter groups and late adopter groups (Rogers, 1962). As already discussed, for a long-term period, the OPRs posted in Group 4 were written by mostly early adopter and early majority groups as well as a little portion of late majority groups, while those posted in Group 5 were contributed by late majorities. Thus, it is not surprising that the number of postings is significantly higher in the earlier stage of the product life cycle. On the other hand, if we compare Groups 5 and 6, the number of OPRs is not much different because the second price drop happened in the middle of the late majority group and the tendency to participate in OPRs before and after the second price drop could have stayed the same, which is also the case of the short-term change in the number of OPRs (the change from Groups G and H) before and after the second price drop.

However, over a short-term period, upon the first price change, the number of OPRs increased significantly. This short-term phenomenon of increased number of reactions can be explained by late majorities' price sensitivity. Since those who participated in OPRs before and after the first price drop are most likely late majorities and their price sensitivity is relatively high, their post-purchase and post-use reactions dramatically increased with a high number of OPRs as well as a large degree of negative emotions (increased negative emotions between Groups A and B). These findings show that individuals contribute a significantly higher number of OPRs to the e-commerce site immediately after the price drop, which implies that the decrease in price not only changes the features of the OPRs, but also increases the number of OPRs posted per day, at least for a short-term period. Moreover, as already discussed, the impact of a price decrease on the number of OPRs per day also diminishes over time, implying the lessened impact of continual price drops on overall level of participation in public opinion sharing.

While both observable and implicit features of OPRs (star rating, review depth, positive and negative emotions) are individuals' reactions embedded in each OPR,

the number of OPRs reflects overall level of participation by online consumers. In this study, we were able to observe that although the level of participation in OPRs decreases over the long term, the participation in OPRs significantly increases upon the first price drop. This shows that the price change (if it is the first time in the product life cycle) will increase the overall level of participation in e-WOM, although, according to IDT, the OPR participants in the period of late majorities (after the first price drop) are known to be less participative in public opinion sharing (Rogers, 1962). With these observations, we can suggest a future research topic on the impact of price changes on overall level of opinion sharing (posting OPRs) by online consumers at the different stages of innovation adoption, possibly in experimental settings. For example, it will be interesting to see the impact of a price drop during the time between early adopters and early majorities (a period known as an important chasm to cross to be successful) on the level of participation by online consumers and on the change in the length of the chasm between early adopters and early majorities.

## 6. Conclusion: implications and limitations

### *6.1 Theoretical implications*

The findings of this study have a number of theoretical implications. First, this study is among the first attempts to investigate online consumers' reactions to price changes embedded in both the observable and implicit features of OPRs. As shown in Table I, extant studies have investigated the impact of price changes on consumers' reactions in traditional offline environments and have suggested that price decreases have a positive impact on consumers' overall reactions, based on the assumption that the relationship between price changes and consumers' reactions is linear. However, our findings suggest that online consumers' reactions to price decreases are more complex than those in offline settings. For example, in the case of the Kindle 2, consumers' reactions to the first price drop were mostly negative, but became slightly recovered at the time of the second price drop. Therefore, we contribute to the body of knowledge on the impact of price changes in e-commerce environments, which have more dynamic and complicated impacts than traditional offline environments.

Second, we look into both the long- and short-term reactions to price changes and find that consumers' reactions to price changes in terms of four features (star rating, review depth, positive emotion, and negative emotion), as well as the number of OPRs per day change over time. For example, we provide evidence that a price decrease is significantly associated with an increasing number of review counts per day in the short term, but the impact of continual price decreases on the same feature diminishes in the long term. This evidence suggests that future research should consider the time-variant nature of the impact of price changes on OPRs in addition to the number and directions (increase or decrease) of price changes.

Third, this study raises the possibility that differences exist in the observable and the implicit reactions between early and late adopter groups in e-commerce environments, by extending the findings of previous research, demonstrating that early adopters are less price sensitive and more involved in focal products than late adopters with respect to traditional offline environments (Ram and Jung, 1994; Tellis, 1988). Thus, this study contributes to the body of knowledge on innovation adoption and product development by examining how these differences between early and late adopters are reflected in OPRs.

Fourth, this study investigates online consumers' emotional reactions to price changes. It is found that emotions are central to customers' consumption behavior

(Bagozzi *et al.,* 1999; Penz and Hogg, 2011). By providing a deeper investigation of how consumers' emotional expressions shown in OPRs evolves longitudinally after two continual price decreases, this study sheds light on the role of price adjustment (one part of marking strategy) on affective reactions of customers, which are found to be important antecedents for consumers' purchasing behavior. Based on our findings on how positive and negative emotions change after prices decreases, future research may investigate a research model on the theoretical relationship among price adjustment, affective status of consumers, and their intention/behavior for purchasing in the online shopping context, with a longitudinal data set.

*6.2 Practical implications*

The results of this study provide insightful implications for online marketers. First, it shows that price changes bring about changes in both the observable features and implicit (emotional) responses of OPRs. As discussed, OPRs are key information sources for online consumers to look into before making purchases, which imply that changes in the features of OPRs influenced by price changes may lead to either the success or failure of products reaching the marketplace. Thus, when online marketers plan to change prices, the first thing they may want to do is test the reactions of potential consumers by asking some sample consumers (e.g. internal, pilot, or focus group consumers) to better understand how they would react and express their opinions online. In this way, merchants can quickly find out how price changes might positively or negatively influence the performance of their sales.

Second, our findings imply that simply decreasing prices might not always be a good idea. The results of the three studies show that the reactions to the first price decrease on consumers' reactions is mostly negative, while the second price decrease is moderately welcomed by consumers. Thus, online merchants should make strategic decisions for price changes to successfully maintain online consumers' reactions in OPRs, which, in turn, lead to increased sales of their products. They should consider the innovation adoption stages of their customers and their characteristics (e.g. usage variety, price sensitivity, tendency to participate in e-WOM, etc.), scan the competitive environment around the focal product, and understand the trend of consumers' reactions in OPRs on a short-term basis. Moreover, setting up more dynamic pricing plans is necessary in order to get the best out of OPRs' role on sales performance.

Third, more specifically, Kindle is a keystone product of the most famous e-commerce website, Amazon.com. Thus, the results of the study can provide direct implications to the marketing strategies in the e-book industry. The research findings show that online consumers are active in watching the price changes of a product even after they purchase and may negatively react to a certain price change attempt, especially for those price sensitive groups in innovation adoption stages. Therefore, the marketers in the e-book industry should keep in mind that price drops may not always be welcomed by online consumers and should prepare some customer service plans to facilitate current consumers' positive reactions, because those who already purchased a Kindle 2 can become a good customer base for their e-book services. For example, with a price drop of an e-book reader, the e-book service provider may send discount coupons for e-books to only those who already purchased the e-book reader around the time of the price drop. Considering online consumers' reactions after the price change, this kind of marketing strategy will not

only satisfy current customers, but also promote positive reactions in OPRs, which will eventually lead to more sales and profits.

Finally, the dissimilar reactions of consumers upon price decreases in the long-term and short-term periods provide practical implications for online marketers who want to adjust their prices according to potential consumers' opinions and demands. For example, looking at two short-term (before and after) periods of two price drops, our findings suggest that the severity and negativity of reviewers' emotions and also the number of OPRs after the first price drop diminishes over time, in that the number of comments and both observable and implicit emotions did not change significantly in the second price drop as compared to the first one. Looking at long-term changes, the period between the first and the second price drop is the most undesirable period for the marketers (i.e. lowest star ratings and positive emotions but highest negative emotions). These findings suggest that for a short-term period, if marketers intend to change the price for the first time, they need to prepare certain compensation packages (e.g. 30-day price matches or credits for e-book consumers who purchased their products within the last 30 days) for those who might complain about the first price drop, so that their possible negative reactions to the first price drop will be neutralized, which will positively influence the followers of the innovation. For a long-term period, our finding suggests that the subsequent changes, when the product is in the second half of the innovation stage (i.e. late majorities or laggards), could be done more liberally than in the earlier stages of a price change, since late majorities and laggards are less participative and critical in OPRs.

### *6.3 Limitations and other future research directions*

In fact, we have suggested four future research topics based on our interpretation of case study findings. However, this study has some limitations and provides several future research directions, other than those suggested based on our findings. The first limitation of the study is that it examined only the reactions to price decreases. Future research should look at the impact of both directions (increases and decreases) of the price change on OPR features. It would be further interesting if future research looked at the impacts of dynamic pricing strategies on OPRs.

Second, as we look into the reactions to price changes embedded in the features of OPRs, we may go further than the features of OPRs. That is, future research could look at the impact of price changes on both OPRs and purchasing behaviors, so that it may investigate the mediating role of OPR features in the relationship between price changes and consumers' purchasing behaviors.

Third, in this paper, to measure qualitative features of OPRs such as emotions, we conducted quantitative analyses, using observable data from text-mining techniques, rather than applying human ratings, where we hire human raters to have them evaluate (i.e. code the level of emotions in OPRs based on Likert-scaled coding schemes) positive and negative emotions. Future studies may use both methods (text mining and human ratings) to triangulate the findings, which will provide more enriched implications.

Finally, there are such factors as product types and reviewers' characteristics to be considered together when we investigate online consumers' reactions to price changes in OPRs. As for product types, a previous study suggested that they can play a moderating role in the relationship between product rating and review helpfulness (Mudambi and Schuff, 2010). However, due to the uniqueness of our focal product (Kindle 2), which had

two price drops within a rather short-term period, it was not possible to find similar cases with different type of products for a multiple-case study. Future research could adopt a multiple-case study approach and investigate how product types influence the relationship between price changes and consumers' reactions, represented in the types of OPR features. In addition, although we were not able to identify reviewers' personal characteristics (e.g. gender, age, regions, education level, income, etc.) as our data were collected from publicly available OPRs on Amazon.com, investigating their influences will be another interesting topic for future research.

## Notes

1. www.amazon.com/gp/help/customer/display.html/?nodeId=201145120
2. http://en.wikipedia.org/wiki/Amazon_Kindle#Kindle_2
3. It is because the Kindle 2 sales were discontinued (October 22, 2009) 16 days after the second price decrease (October 7, 2009).
4. There were limited numbers of "review threads" with additional feedback comments. However, since most of the reviews did not have feedback and remained as threads with only one initiating review, we decided to consider the initiating reviews only as the units of analysis.
5. While thoroughly reading sampled reviews, the two authors manually counted the number of positive and negative emotion-related words and the two variables (positive and negative emotion) were calculated by dividing the number of positive (negative) emotion words by the number of total words.

## References

Baek, H., Ahn, J. and Choi, Y. (2012), "Helpfulness of online consumer reviews: readers' objectives and review cues", *International Journal of Electronic Commerce*, Vol. 17 No. 2, pp. 99-126.

Bagozzi, R.P., Gopinath, M. and Nyer, P.U. (1999), "The role of emotions in marketing", *Journal of the Academy of Marketing Science*, Vol. 27 No. 2, pp. 184-206.

Barone, M.J. and Roy, T. (2010), "Does exclusivity always pay off? Exclusive price promotions and consumer response", *Journal of Marketing*, Vol. 74 No. 2, pp. 121-132.

Barsade, S.G. (2002), "The ripple effect: emotional contagion and its influence on group behavior", *Administrative Science Quarterly*, Vol. 47 No. 4, pp. 644-675.

Baxter, P. and Jack, S. (2008), "Qualitative case study methodology: study design and implementation for novice researchers", *The Qualitative Report*, Vol. 13 No. 4, pp. 544-559.

Bigne-Alcaniz, E., Ruiz-Mafé, C., Aldas-Manzano, J. and Sanz-Blas, S. (2008), "Influence of online shopping information dependency and innovativeness on internet shopping adoption", *Online Information Review*, Vol. 32 No. 5, pp. 648-667.

Chang, A., Hsieh, S.H. and Tseng, T.H. (2013), "Online brand community response to negative brand events: the role of group eWOM", *Internet Research*, Vol. 23 No. 4, pp. 486-506.

Chen, Y. and Xie, J. (2008), "Online consumer review: word-of-mouth as a new element of marketing communication mix", *Management Science*, Vol. 54 No. 3, pp. 477-491.

Chen, Y., Fay, S. and Qi, W. (2011), "The role of marketing in social media: how online consumer reviews evolve", *Journal of Interactive Marketing*, Vol. 25 No. 2, pp. 85-94.

Cheung, C.M., Lee, M.K. and Rabjohn, N. (2008), "The impact of electronic word-of-mouth: the adoption of online opinions in online customer communities", *Internet Research*, Vol. 18 No. 3, pp. 229-247.

Chevalier, J.A. and Mayzlin, D. (2006), "The effect of word of mouth on sales: online book reviews", *Journal of Marketing Research*, Vol. 43 No. 4, pp. 345-354.

Cho, Y., Im, I., Hiltz, R. and Fjermestad, J. (2002), "The effects of post-purchase evaluation factors on online vs offline customer complaining behavior: implications for customer loyalty", *Advances in Consumer Research*, Vol. 29 No. 1, pp. 318-326.

Chung, S. (2013), "The role of online informediaries for consumers: a dual perspective about price comparison and information mediation", *Internet Research*, Vol. 23 No. 3, pp. 338-354.

Cohn, M.A., Mehl, M.R. and Pennebaker, J.W. (2004), "Linguistic markers of psychological change surrounding September 11, 2001", *Psychological Science*, Vol. 15 No. 10, pp. 687-693.

Dall'Olmo Riley, F., Pina, J.M. and Bravo, R. (2013), "Downscale extensions: consumer evaluation and feedback effects", *Journal of Business Research*, Vol. 66 No. 2, pp. 196-206.

Degeratu, A.M., Arvind, R. and Wu, J. (2000), "Consumer choice behavior in online and traditional supermarkets: the effects of brand name, price, and other search attributes", *International Journal of Research in Marketing*, Vol. 17 No. 1, pp. 55-78.

Dellarocas, C., Zhang, X.M. and Awad, N.F. (2007), "Exploring the value of online product reviews in forecasting sales: the case of motion pictures", *Journal of Interactive Marketing*, Vol. 21 No. 4, pp. 23-45.

Dubé, L. and Paré, G. (2003), "Rigor in information systems positivist case research: current practices, trends, and recommendations", *MIS Quarterly*, Vol. 27 No. 4, pp. 597-636.

Epstein, L.H., Jankowiak, N., Nederkoorn, C., Raynor, H.A., French, S.A. and Finkelstein, E. (2012), "Experimental research on the relation between food price changes and food-purchasing patterns: a targeted review", *The American Journal of Clinical Nutrition*, Vol. 95 No. 4, pp. 789-809.

Faruqui, A. and George, S. (2005), "Quantifying customer response to dynamic pricing", *The Electricity Journal*, Vol. 18 No. 4, pp. 53-63.

Forman, C., Ghose, A. and Wiesenfeld, B. (2008), "Examining the relationship between reviews and sales: the role of reviewer identity disclosure in electronic markets", *Information Systems Research*, Vol. 19 No. 3, pp. 291-313.

Ghose, A. and Ipeirotis, P.G. (2011), "Estimating the helpfulness and economic impact of product reviews: mining text and reviewer characteristics", *IEEE Transactions on Knowledge and Data Engineering*, Vol. 23 No. 10, pp. 1498-1512.

Goldsmith, R.E. and Newell, S.J. (1997), "Innovativeness and price sensitivity: managerial, theoretical and methodological issues", *Journal of Product & Brand Management*, Vol. 6 No. 3, pp. 163-174.

Hardie, B.G.S., Johnson, E.J. and Fader, P.S. (1993), "Modeling loss aversion and reference dependence effects on brand choice", *Marketing Science*, Vol. 12 No. 4, pp. 378-394.

Harrison-Walker, L.J. (2001), "The measurement of word-of-mouth communication and an investigation of service quality and customer commitment as potential antecedents", *Journal of Service Research*, Vol. 4 No. 1, pp. 60-75.

Heussler, T., Frank, H., Meyer, F., Vollhardt, K. and Ahlert, D. (2009), "Moderating effects of emotion on the perceived fairness of price increases", in McGill, A.L. and Shavitt, S. (Eds), *NA - Advances in Consumer Research Volume 36*, Association for Consumer Research, Duluth, MN, pp. 332-338.

Homburg, C., Hoyer, W.D. and Koschate, N. (2005), "Customers' reactions to price increases: do customer satisfaction and perceived motive fairness matter?", *Journal of the Academy of Marketing Science*, Vol. 33 No. 1, pp. 36-49.

Hsu, C., Lin, J.C. and Chiang, H. (2013), "The effects of blogger recommendations on customers' online shopping intentions", *Internet Research*, Vol. 23 No. 1, pp. 69-88.

Hu, N., Koh, N.S. and Reddy, S.K. (2014), "Ratings lead you to the product, reviews help you clinch it? The mediating role of review sentiments on product sales", *Decision Support Systems*, Vol. 57, pp. 42-53.

Hu, N., Pavlou, P.A. and Zhang, J. (2006), "Can online reviews reveal a product's true quality? Empirical findings and analytical modeling of online word-of-mouth communication", *The Proceeding of 7th ACM Conference on Electronic Commerce*, *ACM*, *New York, NY*, pp. 324-330.

Jalilvand, M.R. and Samiei, N. (2012), "The impact of electronic word of mouth on a tourism destination choice: testing the theory of planned behavior (TPB)", *Internet Research*, Vol. 22 No. 5, pp. 591-612.

Jiang, P. (2002), "A model of price search behavior in electronic marketplace", *Internet Research*, Vol. 12 No. 2, pp. 181-190.

Kachersky, L. (2011), "Reduce content or raise price? The impact of persuasion knowledge and unit price increase tactics on retailer and product brand attitudes", *Journal of Retailing*, Vol. 87 No. 4, pp. 479-488.

Kalwani, M.U., Yim, C.K., Rinne, H.J. and Sugita, Y. (1990), "A price expectations model of customer brand choice", *Journal of Marketing Research*, Vol. 27 No. 3, pp. 251-262.

Krosnick, J.A., Boninger, D.S., Chuang, Y.C., Berent, M.K. and Carnot, C.G. (1993), "Attitude strength: one construct or many related constructs?", *Journal of Personality and Social Psychology*, Vol. 65 No. 6, pp. 1132-1151.

Lee, M., Kim, M. and Peng, W. (2013), "Consumer reviews: reviewer avatar facial expression and review valence", *Internet Research*, Vol. 23 No. 2, pp. 116-132.

Lee, M.K., Cheung, C.M., Lim, K.H. and Sia, C.L. (2006), "Understanding customer knowledge sharing in web-based discussion boards: an exploratory study", *Internet Research*, Vol. 16 No. 3, pp. 289-303.

Lichtenstein, D.R., Nancy, M.R. and Richard, G.N. (1993), "Price perceptions and consumer shopping behaviour: a field study", *Journal of Marketing Research*, Vol. 30 No. 2, pp. 234-245.

Low, W.S., Lee, J.D. and Cheng, S.M. (2013), "The link between customer satisfaction and price sensitivity: an investigation of retailing industry in Taiwan", *Journal of Retailing and Consumer Services*, Vol. 20 No. 1, pp. 1-10.

Ludwig, S., de Ruyter, K., Friedman, M., Brüggen, E.C., Wetzels, M. and Pfann, G. (2013), "More than words: the influence of affective content and linguistic style matches in online reviews on conversion rates", *Journal of Marketing*, Vol. 77 No. 1, pp. 87-103.

Mazumdar, T. and Jun, S.Y. (1993), "Consumer evaluations of multiple versus single price change", *Journal of Consumer Research*, Vol. 20 No. 3, pp. 441-450.

Moon, J., Chadee, D. and Tikoo, S. (2008), "Culture, product type, and price influences on consumer purchase intention to buy personalized products online", *Journal of Business Research*, Vol. 61 No. 1, pp. 31-39.

Moore, G.A. (1991), *Crossing the Chasm: Marketing and Selling Technology Products to Mainstream Customers*, Harvard Business School, Boston, MA.

Mudambi, S.M. and Schuff, D. (2010), "What makes a helpful online review? A study of customer reviews on Amazon.com", *MIS Quarterly*, Vol. 34 No. 1, pp. 185-200.

Pennebaker, J.W., Chung, C.K., Ireland, M., Gonzales, A. and Booth, R.J. (2007), *The Development and Psychometric Properties of LIWC2007*, LIWC.net, Austin, TX.

Penz, E. and Hogg, M.K. (2011), "The role of mixed emotions in consumer behavior: investigating ambivalence in consumers' experiences of approach-avoidance conflicts in online and offline settings", *European Journal of Marketing*, Vol. 45 Nos 1/2, pp. 104-132.

Raghubir, P., Inman, J.J. and Grande, H. (2004), "The three faces of consumer promotions", *California Management Review*, Vol. 46 No. 4, pp. 23-42.

Ram, S. and Jung, H.S. (1994), "Innovativeness in product usage: a comparison of early adopters and early majority", *Psychology & Marketing*, Vol. 11 No. 1, pp. 57-67.

Richins, M.L. and Bloch, P.H. (1991), "Post-purchase product satisfaction: incorporating the effects of involvement and time", *Journal of Business Research*, Vol. 23 No. 2, pp. 145-158.

Rindova, V.P. and Petkova, A.P. (2007), "When is a new thing a good thing? Technological change, product form design, and perceptions of value for product innovations", *Organization Science*, Vol. 18 No. 2, pp. 217-232.

Rogers, E.M. (1962), *Diffusion of Innovations*, Free Press, New York, NY.

Rotemberg, J.J. (2005), "Customer anger at price increases, changes in the frequency of price adjustment and monetary policy", *Journal of Monetary Economics*, Vol. 52 No. 4, pp. 829-852.

Subramani, M.R. and Rajagopalan, B. (2003), "Knowledge-sharing and influence in online social networks via viral marketing", *Communications of the ACM*, Vol. 46 No. 12, pp. 300-307.

Sudhir, K. (2001), "Competitive pricing behavior in the auto market: a structural analysis", *Marketing Science*, Vol. 20 No. 1, pp. 42-60.

Tellis, G.J. (1988), "The price elasticity of selective demand: a meta-analysis of economic models of sales", *Journal of Marketing Research*, Vol. 25 No. 4, pp. 331-341.

Teng, L. (2009), "A comparison of two types of price discounts in shifting consumers' attitudes and purchase intentions", *Journal of Business Research*, Vol. 62 No. 1, pp. 14-21.

Yin, D., Bond, S.D. and Zhang, H. (2014), "Anxious or angry? Effects of discrete emotions on the perceived helpfulness of online reviews", *MIS Quarterly*, Vol. 38 No. 2, pp. 539-560.

Yuan, H. and Han, S. (2011), "The effects of consumers' price expectations on sellers' dynamic pricing strategies", *Journal of Marketing Research*, Vol. 48 No. 1, pp. 48-61.

Zhang, J. and Wedel, M. (2009), "The effectiveness of customized promotions in online and offline stores", *Journal of Marketing Research*, Vol. 46 No. 2, pp. 190-206.

## About the authors

Kyung Young Lee is an Assistant Professor in the Williams School of Business at Bishop's University. He earned his MBA from the University of Ottawa and received his PhD in Management Information Systems from the Desautels Faculty of Management, McGill University (2012). His research interests include knowledge management, online communities, online word-of-mouth (product reviews), IT innovation, and the impact of smartphone applications.

Ying Jin received her Master's Degree in Management Information Systems from the Ajou University and earned a Bachelor's Degree in Computer Science from the Tonghua Normal

University in China. Her research interests include business intelligence, the business value of IT, e-commerce, consumer relationship management, and online word-of-mouth.

Cheul Rhee is an Associate Professor in the School of Business at the Ajou University. He received his PhD from the State University of New York at Buffalo in 2009. He is currently the Editor-in-Chief of *Agribusiness & Information Management*. He has research interests in e-learning, knowledge management, virtual communities, e-government, and e-business strategies. He has published papers in journals such as *Online Information Review*, *Communications of the ACM*, *Journal of Electronic Commerce in Organizations*, and others.

Sung-Byung Yang is an Assistant Professor in the School of Management at Kyung Hee University. He received his PhD from the KAIST. He was a research fellow in the Desautels Faculty of Management at McGill University. His research interests include the business value of IT, online communities, social media and networks, knowledge management, and electronic word-of-mouth. His research has been published in *Internet Research*, *MIS Quarterly*, *Information Systems Research*, *Computers in Human Behavior*, *Electronic Markets, Social Science Computer Review*, and others. Sung-Byung Yang is the corresponding author and can be contacted at: sbyang@khu.ac.kr