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An Empirical Study on the Interaction Effects between the Customer Reviews and the Customer Incentives towards the Product Sales at the Online Retail Store

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ABSTRACT

Online customer reviews (i.e., electronic word-of-mouth) has gained considerable interest over the past years. However, a knowledge gap exists in explaining the mechanisms among the factors that determine the product sales in online retailing environment. To fill the gap, this study adopts a principal-agent perspective to investigate the effect of customer reviews and customer incentives on product sales in online retail stores. Two customer review factors (i.e., average review ratings and the number of reviews) and two customer incentive factors (i.e., price discounts and special shipping offers) are used to predict product sales in regression analysis. The sales ranking data collected from the video game titles at Amazon.com are used to analyze the direct effects of the four factors and the interaction effects between customer review and customer incentive factors to product sales. Result reveals that most relationships exist as hypothesized. The findings support both the direct and interaction effects of customer reviews and incentive factors on product sales. Based on the findings, discussions are provided with regard to the academic and practical contributions.

Keywords: Online Customer Reviews, Online WOM, Electronic Word of Mouth, eWOM, E-Commerce

Ⅰ. Introduction

Thanks to the emergence of high-speed Internet and the widespread of World Wide Web, people are able to communicate each other freely beyond geographical restrictions (e.g., location or time). Supported by such technological advancement, over the past years, e-commerce has thrived rapidly accompanied by the digital economy. According to the Nielsen report on e-commerce (2014), business-to-consumer (B2C) e-commerce sales worldwide reached $1.5 trillion in 2014, with nearly 20% growth rate over 2013. Corresponding to the increasing trend of overall transactions and interests in

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e-commerce, researchers tried to uncover the mechanism of consumers' purchase decision process by finding the factors significantly influencing the product sales in the online transaction environment. As a result, they found that information sharing contributed the e-commerce to evolve rapidly (Zheng et al., 2013).

Exploring numerous factors affecting customers to purchase a product at the online retail store, some researchers have paid attention to the role of online word-of-mouth (WOM) from information sharing perspective, also known as e-WOM (Li and Hitt, 2010). In fact, e-WOM takes place in various virtual places including not only online storefronts but also online forums, personal blogs, social media, and so on. Especially, researchers found the advancement of IT makes e-WOM salient among those who have purchased or would purchase in the e-commerce environment (Duan et ai., 2008).

From information sharing perspective, online product reviews have been an important part of e-WOM because buyers in e-commerce tend to gather as much information as possible to make the best decision from various information resources such as advertisement, news articles, and consumer reports. This means that customers' decision to purchase a product at the online storefront could be influenced significantly by sharing prior experience of those who already have purchased or used the product before. Particularly, online product reviews are relatively easily accessible than any other purchase related informational resources as well as useful for buyers to make pre-purchase determination or fill information gap before purchase. Furthermore, online product reviews on the store website are the most salient means of communication among online customers because of its directness of prior experienced customers to potential customers (Duan et al., 2008; Li and Hitt, 2010). Besides the online reviews, there are several other significant factors that can influence customers' purchase decisions in e-commerce environments. Those factors include the price discounts and the free (or discounted) expedited delivery options that can be called the customer incentives factors (Hermann et al., 1997).

Even though information sharing is a way for buyers to gather information in B2C e-commerce environment, it is not avoidable that information asymmetry occurs between buyers and sellers (Pavlou et al., 2007). Even though buyers try to obtain as much information about the products and sellers in e-commerce transactions, they will still have imperfect information due to the structure of e-commerce marketplace. Thus, buyers expect compensations for the uncertainty in e-commerce transactions while they seek for additional source of information about the product and sellers. Furthermore, previous literature claimed that factors such as customer product reviews at online stores could influence the online product sales (Dabholkar, 2006; Duan et al., 2008; Hu et al., 2008), but the findings were mixed (Duan et al., 2008).

Given that there is still a dearth of knowledge how online reviews and other significant incentives factors (i.e., price discount and free shipping offers) influence the sales simultaneously, it would be necessary to fill the gap. More specifically, little attention have been paid to the interactions among the effect of the customer reviews and the incentives on the product sales in B2C e-commerce context. Therefore, we claim that it is important to address the role of the e-WOM and the incentives factors in terms of their direct and interactive effects on the product sales. To fill the research gap from prior studies and to explain information asymmetry between buyers and sellers in the context of e-WOM, we adopted

Pavlou et al. (2007)'s *principal-agent perspective* rooted from agency theory. Accordingly, this study identifies the factors that affect the product sales in e-commerce environment focusing on e-WOM (i.e., online customer reviews) and customer incentives (i.e., price discount and special shipping offer) as well as the interactions among the review factors and the incentive factors.

This study is designed to answer the research questions as follows: 1) Does each of the e-WOM and the customer incentive factors directly influence the product sales at the B2C online retail stores?; 2) How the e-WOM and the incentive factors interactively influence the product sales at the B2C online retail store? By addressing the relationships between the product sales and factors associated with the online WOM and the incentives at the online retail store, this study sheds light on understanding of the customer behaviors in e-commerce environment.

Using data gathered from a specific product category (i.e., video game titles) at a large online retail store (i.e., Amazon.com), this study builds an inclusive model that encompasses the relationships between product sales and two online review factors, namely, the customer review ratings, the number of customer reviews, and two incentive factors, namely, the price discount, and the special shipping offer, as well as the interaction effects between the online review factors and the incentive factors.

In the following section we review the theoretical foundations related to the study. Next, the research model of the study is suggested based on the theoretical foundation. Then, the research methods, including data collection, statistical analysis, and the results of the analysis is presented. Lastly, discussions, conclusions, and limitations of the study are provided.

Ⅱ. Theoretical Background

2.1. Principal and Agent Perspective

Our study adopted the principal-agent perspective (Pavlou et al., 2007) that stemmed from the agency theory as a theoretical underpinning. Because agency theory deals with the ubiquitous principal and agent relationship, many academic disciplines have applied agency theory (Eisenhardt, 1989) to various research areas (Basu et al., 1985; Eccles, 1985; Eisenhardt, 1985). In e-commerce context, buyers take the position of principal and sellers are positioned at an agent because "buyers (principals) delegate the delivery responsibility to sellers (agents) who typically have more information" (Pavlou et al., 2007, p. 106). Differently from offline stores where buyers and sellers create a line of transactions at the same location and face-to-face basis, any transactions in e-commerce environment limit the buyers' ability to access products directly due to the physical dispersion between sellers and buyers. Therefore, most buyers are only able to get information about products or services through limited resources (e.g., product descriptions at the store websites), which this physical distance causes information asymmetry between sellers and buyers. Information asymmetry refers that buyers (online customers) hold less product information than sellers. Thus, it causes incongruent goals on buyers and sellers transactions stemming from retaining different expectations (Pavlou et al., 2007). Accordingly, the information asymmetry arises uncertainty problems due to the principal party (buyer) having incomplete information about agent (seller) activities (e.g., Keil et al., 2004; Pavlou et al., 2007). Uncertainty is serious matter because the principle party (buyer) may perceived different level of transaction performance or satisfaction in certain online transaction envi-

ronments depending the degree of uncertainty of products or sellers.. Furthermore, it influences the buyer's intention to purchase a product or service, while bearing additional cost (Pavlou et al., 2007).

In addition to the incomplete information issue, the risk of uncertainty and agency costs are addressed in many previous research studies. For example, buyers (the principal) most likely have difficulty monitoring their purchased products or services because no physical facilities exist to confirm their transactions visually in the online transaction environment (Pavlou et al., 2007). In addition, there exist high possibilities that sellers (the agent) will not deliver the ordered product to the buyer on time or fail to render a designated service to the buyer (or customer).

Resulting from information asymmetry, prior literature suggests that the principal party has two options to prevent unintentional misuse from agent by: (1) purchasing information about the agent's behavior; or (2) rewarding the agent based on performance or outcome (Eisenhardt, 1985). The agency costs refer to the difference in the goals pursued by the principal (buyers, in the context of online transactions) and the agent (sellers, in the context of online transaction). Usually, prior literature has cited three types of agency costs: (1) monitoring costs, (2) bonding costs, and (3) residual loss (Gurbaxani and Whang, 1991). First, monitoring costs are incurred when the principal hires another party to monitor the agent. For example, accessing the storefront website (hiring another party to fulfill the transaction, rather than physically going to the store) and purchasing a product incur buyers' monetary expenditure or time spending in terms of monitoring and fulfilling their transactions. Second, bonding costs are incurred when the agent wastes time during transaction process, and this cost ultimately transfers to the principal party as an increment of the product price or service charge. In the context of the e-commerce environment, a shipping delay from the seller causes the principal's additional expenditures in time consumption or psychological patience. Last, even it mitigates both monitoring and bonding cost by principal's appropriate response, the principal may suffer from unexpected partial loss of welfare (residual loss).

This research focuses on information asymmetry between buyer and sellers in the context of e-commerce environment. We posit that the information asymmetry are alleviated by customer reviews and customer incentives. Ultimately, those main factors play an important role in products sales by minimizing information asymmetry and potential risk from uncertainty. First, we adopt online customer reviews and incentives as a supplemental way to reduce information asymmetry and an application of the monitoring and bonding costs stated above in our research context. When buyers consider their shopping products, they usually think price, product quality, design, brand, and others' opinion to reduce any possible monetary loss under uncertainty. Therefore, either referring to customer reviews or using third parties to make payments for products helps buyers to mitigate or minimize the effect of information asymmetry, resulting in compensating for the imbalance in shared information about the products or services.

2.1.1. Online Customer Reviews

In buyer and seller relationships from principal-agent perspective, uncertainty stems from any unpredictable transaction outcome due to information asymmetry, consisting of *seller quality uncertainty* and *product quality uncertainty* (Pavlou, 2007). In terms of e-WOM, well-written prior customers' reviews become a proxy of the actual product

quality (Gu and Lin, 2006; Li and Hitt, 2008) as well as a source of resolving information asymmetry by supplementing the offline communication before purchase (Chevalier and Mayzlin, 2006; Zhu and Zhang, 2010).

While online reviews are presented to a product whether positively by the customers who are satisfied or negatively by those who are dissatisfied, more information about the product would be accumulated at the online retail store. Eventually, the more reviews on a product are posted, thus the richer information about the product would the potential customers obtain. Accordingly, cumulative reviews become a good resource for future customers to make better purchase decisions. Even if there are negative reviews on the product, potential customers may override it if the drawbacks mentioned in the reviews are not critical for them; rather those reviews would be accepted as the additional sources of product information and used to mitigate the asymmetry of information between buyers and sellers in e-commerce environment.

e-WOM is considered as one of the most significant factors that influence the product sales (Duan et al., 2008; Godes and Mayzlin, 2004). Affirmative opinions or positive feedbacks on a product from trustworthy people would encourage the potential customers to build a positive attitude toward the product, ultimately lead high possibility to purchase the product. As Chen et al. (2004) pointed out, customers would have more trust on a product when they have an increase in information sources. They showed that the increasing number of customer reviews leads the overall rating to converge to the true quality (Chen et al., 2004), thus it overcomes the issue of potential *product quality uncertainty*.

2.1.2. Customer Incentives

To compensate information asymmetry between buyers and sellers in e-commerce environment, offering customer incentives from sellers are widespread. Most common types of the customer incentives at the online retail stores are the price discounts and the exemption of shipping/handling charges (Brynjolfsson and Smith, 2000). Those incentives are important in that any provided incentives (e.g., discounted price or free shipping charge) by sellers encourage buyers' transactional activities and help confirm sellers' willingness to show themselves as high quality sellers.

First, price discount can play a role in mitigating uncertainty from insufficient information regarding products or sellers because buyers may feel compensated emotion by paying less money for any given products or services that are uncertain. Especially, price discount becomes a key benefit between buyers and sellers in online commerce if they reside geographically dispersed location each other; thus online buyers are exposed a bearing inevitable downside in terms of accessibility to the offline stores. The goal-oriented (contrary to the experiential) consumers tend to get benefit from price discount because online stores are more accessible and convenient for them when they purchase products (Wolfinbarger and Gilly, 2001).

Second, current research adopts the exemption of shipping charge as another customer incentives which a factor affecting buyers' transaction behaviors by additional benefit. In most cases of the online transaction environment, online buyers are responsible for the shipping and handling charges. The additional charge on top of the product price could be a discouraging factor for customers to shop at the online retail store. To alleviate this problem, many online retailers provide various types of incentives

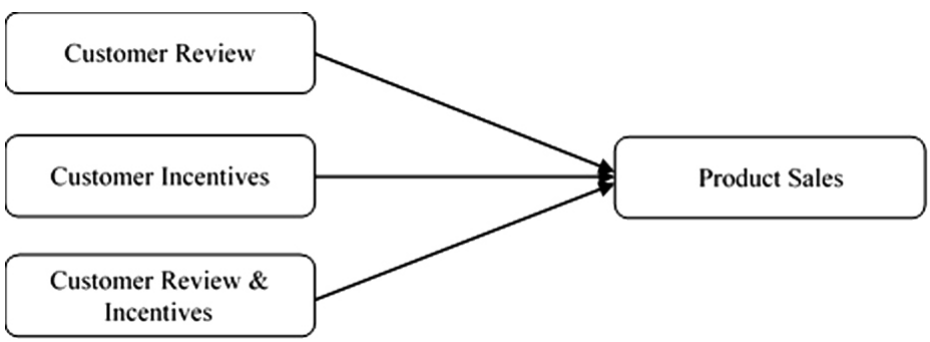
related to the shipping/handling charges to their customers. As shipping cost is one of the major complaints of customers toward online shipping (Cho et al., 2002), providing special offers such as exemption of shipping charges (i.e., free shipping) could be an effective way to increase sales at the online stores.

Ⅲ. Hypotheses and Research Model

Based on theoretical arguments above, we propose a research framework and hypotheses (<Figure 1>). Under the concept of information asymmetry between buyers and sellers, we consider two aspects of customer online reviews (online WOM factors): the average review ratings and the number of reviews. As another factor affecting product sales, customer incentives split into two parts: the price discount and the special shipping offer at the online retail store individually. Additionally, in case of any interaction effect between these two factors, our study proposed four moderating interaction effects between the online WOM factors and the customer incentive factors towards the product sales.

3.1. The Role of Customer Reviews on Product Sales

In the e-commerce environment, information asymmetry is common because of the geographical remoteness and the limited contact opportunity between the buyers and the sellers. It is a considerable issue because online customers rarely have chance for hands-on experience with products prior to the purchase. Therefore, most online stores (e.g., Amazon.com) open review rating boards for customers to share their experience with the products. Through the review boards, potential customers obtain information about the products beyond what the manufacturer and/or merchants provide. The comments by other people who already have experienced with the product could be a very significant source of information for potential customers to relieve information asymmetry between buyers and sellers. The higher level of uncertainty regarding products due to serious information asymmetry the buyer perceive, the more likely buyers rely on others' opinions. Accordingly, good review ratings will influence the purchase decision as well as more number of the reviews on a product would result in more sales of the product in any case that the contents



<Figure 1> Research Framework

of the reviews are either positive or negative.

Previous research supports our arguments in that positive product reviews would give good impressions to those who consider purchasing the product, hence customer reviews influence on sales positively (Chevalier and Mayzlin, 2006; Clemons et al., 2006; Mudambi and Schuff, 2010). Additionally, the number of reviews would affect customers purchase behavior especially product sales with less popularity (Zhu and Zhang, 2010). Moreover, customers interpret the large market share of a product as a signal of the product's high quality (Caminal and Vives, 1996). Therefore, based on our arguments above, we posit:

H1a: The degree of overall review ratings on a product will positively affect the sales of the products at the online retail store.

H1b: The number of product reviews will positively affect the sales of the products at the online store.

3.2. The Role of Customer Incentives on Product Sales

One of the major benefits of shopping at online stores is that online stores usually offer lower prices than the traditional offline stores because they can save operational costs to run offline stores. Given that the low price is a strong motivator for the customers' purchase behaviors, larger price discounts tend to attract more customers in online stores than offline stores. Prior literature found that high price discount positively influences on product offer value and increase buying intention (Alford and Biswas, 2002; Hermann et al., 1997). It is also shown that the perceived economic benefit, either directly or indirectly, is a strong drive for price-sensitive people to shop online (Iqbal et al., 2003; Kang et al., 2013). Degeratu, Rangaswamy, and Wu (2000) also found that consumers are sensitive to the price discount more in online than in offline environment.

In addition to price discount, free or special shipping offers are another customer incentives to reduce customers' anxiety of transaction uncertainty or to compensate for bearing time gap between placing orders and actual delivery of the product. In other words, extra shipping and handling charge can be a deterrent aspect for customers when they shop at online stores. Actually, common strategies for many online retail stores boost their sales by offering special shipping offers at certain special days (e.g., mother's day) for selective items or products. Prior literature found that buyers' sensitivity a shipping fee or handling charges are influential factor affecting purchase intention (Xia and Monroe, 2004). Based on arguments above, accordingly, we posit:

H2a: The price discount of the product will positively affect the sales of the products at the online store.

H2b: Special shipping offers will positively affect the sale of the product at the online retail store.

3.3. The Interaction Effects of Online Reviews and Incentives on Product Sales

Besides the direct effects of the factors towards the product sales, it is possible that interaction effects exist among the factors. It is because both customer reviews and incentives could be a part of buyers' active involvement to resolve information asymmetry.

First, the online customer review rating can moderate the effect of customer incentive factors on the product sales. Aligning with the principal – agent perspective by Pavlou and colleague's study (2007), we posit that high review ratings reduce the buyers' perceived uncertainty. When buyers find good review

ratings on the product that they consider purchasing, they are more likely to purchase the product even without incentives because they are willing to pay a premium price for the products or vendors which they trust (Reichheld and Schefter, 2000). On the contrary, if the product review ratings are not good enough or lower than expected, buyers are likely to seek for rewards compensating the uncertainty of the product quality or seller's fulfillment of transaction, including price discount. Thus, the price discount and special shipping offer can play a role in purchase decision to mitigate their anxiety towards uncertain quality of the product.

Specifically in case that the review rating is high, the buyers' purchase intentions would be high as well even without interventions or incentives. Hence, sellers seldom offer price discount or special shipping offers to promote the product sales. On the other hand, in case that the review rating is low, it would increase the buyer's perceived uncertainty towards the product, which accordingly decrease the buyers' purchase intention. To overcome the relationship, sellers often provide potential customers with various incentives, including price discount and special shipping offers in B2C e-commerce environment. Buyers accordingly accept the incentives to rationalize the behavior of purchasing product with uncertainty. In the line of the reasoning, the effect of incentives would be stronger as the review rating decreases, and vice versa. Therefore, we posit:

H3a: The price discounts rate will have more effects on product sales under low level of average review ratings than high level of average review ratings.

H3b: The special shipping offers will have more effects on products sales under low level of average review ratings than high level of average review ratings.

Second, the number of reviews is also expected to moderate the relationships between the customer incentives and the product sales. Again, a large number of positive reviews could signal the potential customers that the product is popular in the market, indicating high quality product. Zhu and Zhang (2010) claimed that customers tend to look for the online reviews for popular products more frequently. Being exposed to a popular product, potential customers could be led to positive affective status, which eventually makes them purchase the product (Bornstein, 1989). Similarly, the numbers of reviews affect the buyers' perceived uncertainty in accordance with principal – agent perspective (Pavlou et al., 2007). When buyers find a product has a small number of reviews written by previous customers, the uncertainty towards the product would increase or at least remain in still. However, a large number of reviews play a role in further information resources, eventually decreasing the uncertainty. Hence, buyers are more likely to purchase products with large numbers of reviews even without incentive because they are willing to accept premium price for the high quality product.

On the contrary, buyers would more actively seek for incentives if the product has a small or few numbers of the reviews written by the previous customers because they want to be compensated for the uncertainty associated with the purchase. Under the circumstance, incentives offered by sellers would mitigate the relationship. If an appropriate incentive is offered to the product with small reviews, it can boost the product sales by compensating the perceived uncertainty that buyers may have. To the contrary, incentives will not much affect the product sales in case of a large number of reviews because the mitigating uncertainty effect is minimal. Hence, the effect of incentives would be stronger as the

number of reviews decreases, and vice versa. Therefore, we posit:

H4a: The price discount will have more effects on product sales under large numbers of product reviews than small numbers of product reviews.

H4b: The special shipping offers will have more effects on product sales under large numbers of product reviews than small numbers of product reviews.

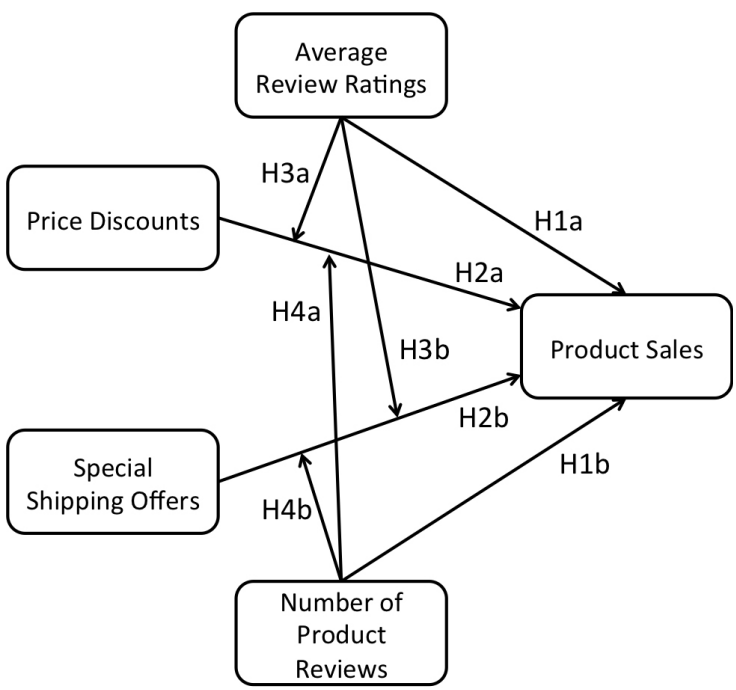
A comprehensive research model addressing the eight hypotheses above is described in <Figure 2>. The four direct effects of the factors, namely, the effect of price discounts, special shipping offers, average review ratings, and number of product reviews, on the product sales as well as the four interaction effects are included in the research model.

Ⅳ. Research Methods

4.1. Data

Data for analysis was collected in April 2011 at Amazon.com, which is the biggest online retail store in the world (Loeb, 2013). Amazon.com allows its registered customers to write/read reviews freely on the product they sell. The online retailer also allows its customers to rate the product when they write a product review. Customers who write a review on a product are required to enter their rating on the product in 1 to 5 stars scale. An example of product review page at Amazon.com is presented in <Figure 3>. A potential customer who considers purchasing a product can find various opinions about the product at the customer reviews page.

For data collection, a specific product category



<Figure 2> Research Model for Sales in the Online Store

<Figure 3> An Exemplar Customer Review Page at Amazon.com

(i.e., Video game – Wii platform – Action genre) was chosen. Video game titles have been in a significant status in e-commerce. They are the third of the most purchased products at online stores along with DVD titles next to books and apparels (Nielson, 2008). Moreover, video games are usually regarded as an experiential good. The quality of video game is quite subjective (Mudambi and Schuff, 2010), so the other customers' reviews could play an important role in the potential customers' purchase decision.

Using an automated script, information of all the products under the specified category were retrieved. Initially, under the category, 351 game title information was obtained. Then relevant information of each product such as product description, customer review ratings, the number of reviews, price (original price and discounts), and special shipping offers was extracted. Among the initial 351 game titles, 124 were excluded from the analysis due to the incomplete information and/or other unsuitability for the analysis. For instance, some game titles are bundled with hardware such as remote controller, add-on accessories, etc. These products were excluded because customers would have a different set of evaluation criteria such as durability or compatibility of the hardware when they consider purchasing those bundled products than the standalone game titles. Meanwhile, some products are not to be shipped physically but only downloadable

digitally. In this case, customers would also have different purchase decision process than the game titles which are packaged in physical media and shipped to the customers. It was concluded not to include those bundled products or download-only products in the analysis. Lastly, some products that are obviously misclassified into the product category by Amazon.com were also excluded from the analysis. After the data refining process, total 227 products remained for the statistical analysis.

4.2. Statistical Analysis

Several data refinement steps were done prior to the statistical analysis. First, the actual sales volume of each product is not explicitly revealed at Amazon.com. Instead, the online retailer provides the best-selling product rankings for each product category. The best-selling ranking at Amazon.com is a list of the products in a particular product category sorted based on the past sales history. To clarify, a product ranked at number 1 in the sales ranking means that the product has been sold more than any other products in the product category. In this study, this sales rank is used as the surrogate of the sales volumes of the products, which is also used as the dependent variable of the multiple regression analysis. Rank transformation technique (Cohen et al., 2003) was used to transform sales ranking numbers (Sales_rank) to a variable with a standard normal distribution. More specifically, the rank transformation technique is useful to transform data consist of ranks (Cohen et al., 2003), by normalizing distribution of the data based on percentiles of the normal curve. By its nature, ranks are rectangularily (or uniformly) distributed (i.e., only one product corresponds to the each rank number), which is not suitable for dependent variables in multiple regression. Given that Amazon.com does not officially announce the sales volume of products, the sale rank is the only information we could obtain regarding the sales. Although there are some limitations of rank transformation, it is accepted as useful in various statistical analyses including multiple regression (Conover and Iman, 1981). The rank of each product is expressed as cumulated proportions, and converted to the corresponding z-value in standard normal distribution table. For example, in the dataset, a game title named "Super Mario Galaxy 2" ranked at the 4th in the best selling rank. Thus the percentile value of the game title among 227 data points is 0.01754, and the corresponding z-value to the percentile value is -2.1073. As such, the z-values for all the other game titles are obtained to be used as the dependent variable in the regression analysis.

Second, after the number of reviews of each game title and the average review ratings are reviewed, the numbers of reviews variable were converted to a new variable (Num_review_ln) by natural log transformation due to its far right skewed distribution. The average review ratings (Avg_rating) of the products were used as original data in the regression analysis. This transformation affects the interpretation of the analysis. By using the log-transformed number of reviews as an independent variable in multiple regression analysis, the impact of the number of reviews on product sales would become marginal as the number of reviews increase exponentially. More details about the interpretation of the transformation will be discussed in the next section.

Third, at Amazon.com, customers may be offered a special shipping if they join a "Prime" membership program. A customer who has the Prime membership can choose their orders delivered via 2-day expedited shipping with free of charge with no minimum order size in case that the purchasing product is eligible

for the Amazon Prime program. Started since 2005, it is estimated that about 40 million members subscribe Prime member program in 2015 with increasing growth rate (Ungerleider, 2015). Given that Amazon.com's active user base is about 244 million in 2014 (Duryee, 2014) and the average spending of Prime members is three times more than that of non-members (Weise, 2015), special shipping offers exclusively provided to Prime members is significant part of customers' purchase decision. Thus, it would be reasonable that the Prime shipping offer is included in the analysis of the current study. A dummy variable (Prime_shipping) is used to record whether the product is eligible for the prime shipping so the customer can have the product shipped faster and cheaper.

Lastly, at Amazon.com many products are available at discounted prices compared to the original price. On each product page at Amazon.com, customers can view the original price and the discounted price at the same time, so they can find how much the product price is reduced in original dollar amount as well as in percentage. For example, the list price of "Super Mario Galaxy 2" was presented $49.99 at Amazon.com as of April 21, 2011. The retailer offered $5.65 of price discount for the product so the customers actually purchased the product at $44.34, which was 11.3% less than the original list price. The price discount ratio (DC_ratio) is included as a variable that captures the percentage of the discounts compared to the original list price, which is 0.113 (or 11.3%) in the example above.

For control variables, the price of the game titles and the days in the market are considered. We took the actual selling price from each game titles to control for the absolute value of the price. The price of the game titles ranged from $3.98 to $149.99 with the average of $26.28. Then we also counted the days of each game title from its release date. Since the sales has an accumulative nature, which means the earlier it has been released, the more likely it has been outsold, the days in the market might influence the sales. The days in the market is included in the analysis to check this. <Table 1> summarizes the descriptions of the variables used in the analysis.

<Table 2> is the correlation matrix among the variables. Three independent variables (Avg_rating, Num_review_ln, and Prime_shipping) are correlated to the dependent variable (Sales_rank) with a statistical significance ($p < 0.001$). In addition, average review ratings variable (Avg_rating) is correlated with the number of reviews variable (Num_review_ln) and price discount variable (DC_ratio) with a statistical significance ($p < 0.001$ and $p < 0.05$, respectively).

<Table 1> Description of Variables

Variable	Description	Mean	*SD*
Sales_rank	- Lower rank represents more sales; rank transformation	0	1
Avg_rating	- Average review ratings from all the reviews on the product	3.65	0.88
Num_review_ln	- Number of reviews on the product; log transformation	2.77	1.47
Prime_shipping	- Dummy variable; 1 if eligible for Prime shipping , otherwise 0	0.63	0.48
DC_ratio	- Ratio of discount pricing over the original list price	0.25	0.24
Price	- Absolute value of the actual selling price	26.28	21.47
Days	- Days since the game titles first released	771	469

<Table 2> Correlation Matrix Among Variables

	Sales_rank	Avg_rating	Num_review_ln	Prime_shipping	DC_ratio	Price	Days
Sales_rank	1						
Avg_rating	- 0.356***	1					
Num_review_ln	- 0.721***	0.345***	1				
Prime_shipping	- 0.546***	0.054n.s.	0.227**	1			
DC_ratio	- 0.135n.s.	- 0.155*	- 0.115n.s.	0.109n.s.	1		
Price	0.238***	0.099n.s.	- 0.054n.s.	- 0.394***	- 0.524***	1	
Days	0.130*	- 0.101n.s.	0.265***	- 0.206***	0.023n.s.	- 0.103n.s.	1

Note: ***: $p < 0.001$, **: $p < 0.01$, *: $p < 0.05$, n.s.: non-significant

4.3. Analysis Results

A multiple regression analysis is performed to test the hypotheses proposed in the previous section. For this purpose, total six models are reported. The first model includes only the control variables (price and days). In the second model the four basic variables (average review ratings, number of reviews, special shipping offers, and price discount) are included as the predictor variables to check if the direct relationships exist. As shown in the model 2 of the <Table 3>, all four variables have significant relationship with product sales with all negative standardized coefficients toward the sales ranking, which shows all four variables positively affect the product sales. This supports the hypotheses regarding the direct relationships between the four variables and the product sales (H1a, H1b, H2a, and H2b). The reported adjusted R-square value of model 2 is 0.763.

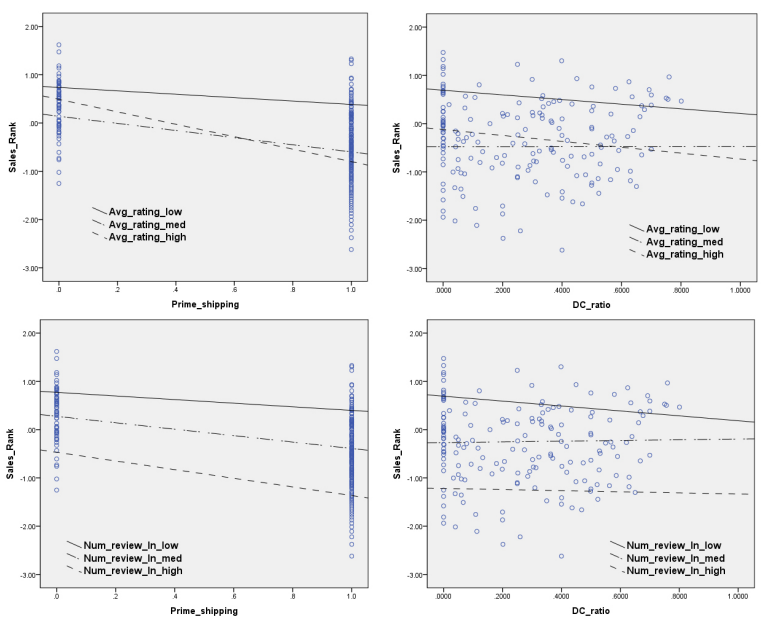
Then the interaction terms between the review and the incentive variables were added one by one in model 3, 4, 5, and 6. The <Table 3> reports the incremental change of R-square value of the regression models by adding each interaction terms. It shows there are significant increases in adjusted R-square values in all the regression models, which supports the interaction effects are significant.

A detailed examination of the moderating effects of the two review variables on the relationship between the incentive variables and the product sales would be essential to understand the model. The data set is grouped into three levels (low, medium, and high) by the two review variables based on the distances from the mean. Then the four interaction effects between the review variables and the incentive variables are plotted as in <Figure 4>. The three different levels of the review variables are represented by the three lines and the slopes show the linear relationships between the incentive variables and the product sales ranking at the three levels. The two left boxes in <Figure 4> show the moderating effects of the average review ratings and the number of reviews on prime shipping. It is found that the slopes of the linear relationship between the high level of review variables and the product sales are steeper than the low or medium level of review variables. This suggests that the higher levels of reviews ratings are more subject to the special shipping offers toward the product sales. This is not consistent with the hypotheses H3b and H4b, which expect the effects of the special shipping on the sales is more salient in the products with lower levels of review factors.

<Table 3> Regression Analysis Results

		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Std. coeff.	*p*-value	Std. coeff.	*p*-value	Std. coeff.	*p*-value	Std. coeff.	*p*-value	Std. coeff.	*p*-value	Std. coeff.	*p*-value
Price		0.156	0.001	0.014	0.774	0.027	0.514	0.009	0.824	-0.052	0.168	0.220	0.000
Days		0.254	0.039	0.250	0.000	0.272	0.000	0.256	0.000	0.251	0.000	-0.130	0.000
Avg_rating				-0.103	0.014	0.230	0.000	0.113	0.189	0.189	0.002	0.253	0.000
Num_review_ln				-0.705	0.000	-0.680	0.000	-0.675	0.000	-1.053	0.000	-.1.295	0.000
DC_ratio				-0.197	0.000	-0.140	0.000	-0.528	0.000	-0.624	0.000	-0.824	0.000
Prime_shipping				-0.302	0.000	1.002	0.000	0.994	0.000	0.799	0.000	0.755	0.000
Avg_rating × Prime_shipping						-1.390	0.000	-1.416	0.000	-1.723	0.000	-1.776	0.000
Avg_rating × DC_ratio								0.397	0.003	0.417	0.000	0.154	0.145
Num_review_ln × Prime_shipping										0.691	0.000	0.714	0.000
Num_review_ln × DC_ratio												0.517	0.000
Regression model *p*-value		0.001		0.000		0.000		0.000		0.000		0.000	
R^2	△ in R^2	0.081	0.081	0.771	0.691	0.838	0.066	0.847	0.009	0.879	0.032	0.912	0.033
Adj. R^2	△ in Adj. R^2	0.070	0.070	0.763	0.693	0.831	0.068	0.839	0.008	0.872	0.033	0.907	0.035
F change	Sig. F change	7.298	0.001	122.355	0.000	65.680	0.000	9.240	0.003	42.397	0.000	59.987	0.000

Note: * Dependent Variable: Sales_Rank



<Figure 4> Plotted Interaction Effects

On the other hand, the two boxes in the right in the <Figure 4> shows the slopes of the linear relationship between the low level of review factors and the product sales are steeper than the high or medium levels of review variables. This suggests the effects of the price discount on the sales are more evident under the lower levels of reviews variables. This supports the hypotheses H3a and H4a.

Ⅴ. Discussions

The result of the analysis in the previous section supports that product reviews and customer incentives are strong predictors of the product sales at the online retail store. In Model 2 of <Table 3>, the standardized coefficients of each independent variable are all negative, which shows all four factors affect the sales positively when they are considered simultaneously. This result successfully conforms to the previous literatures' claims in that the reviews and incentives are the strong predictors for the product sales at the online retail (B2C) store (Alford and Biswas, 2002; Chevalier and Mayzlin, 2006; Clemons et al., 2006; Dabholkar 2006; Duan et al., 2008; Godes and Mayzlin, 2004; Hermann et al., 1997; Hu et al., 2008; Mudambi and Schuff, 2010). Among the four direct predictors, the log- transformed number of reviews has the largest impact, implying that customers who consider purchasing a product at the online retail store are more likely to buy the product as they get more information from the various reviews on the product. In other words, customers are likely to purchase products with many reviews because more reviews would provide various points of views on the product. This also can be supported by the claim that customers tend to rely heavily on the products popularity (Zhu and Zhang, 2010). When the customers don't know about the popularity of products, they could consider the number of reviews as a proxy of the popularity. Another implication from the logged variable is that the increasing effects of the number of reviews on the product sales become marginal as the number of reviews increases. That is, for instance, the increase of effect of the number of reviews from ten reviews to twenty reviews on the product sales would be much higher than the increase of effect from ninety reviews to one hundred reviews. It is plausible because the potential customers might concern about the number of reviews much when the reviews are relatively small, but when the reviews are large enough, such as hundreds, additional reviews would not make much difference to the customers' attitude.

In addition, another important point finding of the current study includes interaction effects between the product reviews and the incentives on the sales. While the hypotheses for the moderation effects of review variables on the special shipping variables (i.e., prime shipping) are not supported, the hypotheses for the moderating effect of the review variables on the price discounts are fully supported. Actually, the fact that H3b and H4b failed to be supported could provide a new viewpoint of the issues in understanding customer behaviors in B2C e-commerce environment. Specifically, it suggests that customers act more sensitively in purchasing a product with special shipping offers when the product has a high review rating or a large number of reviews. This could be understood in a sense that customers tend to rely more on the reviews than on the incentives. Thus, when the combination of the two factors happens, for example, encountering a special shipping offer on a product with good reviews or large review counts, potential customers will be more likely to decide to purchase the product. On the contrary,

for a product with low level of reviews it would be not much effective to offer special shipping because the low level of reviews discourage customers so much that they would not consider purchasing the product. As Pavlou et al. (2007) claimed, low level of review factors directly influence the buyer's perceived uncertainty, which is the significant factor on the purchase intention. Therefore, while the incentives offered on the products with high review factors could enhance the buyer's purchase intention, which ultimately leads more product sales, the incentives offered on the products with low review factors might not enough to eliminate the buyer's strong perceived uncertainty (or negative impression) towards the products.

On the other hand, the results of the analysis show the existence of interaction effect between the review factors and price discount on the product sales. This suggests that it is an effective way of mitigating customers' perceived uncertainty to provide price discounts when the review levels are low. With information asymmetry, buyers seek ways of minimizing the uncertainty or being compensated for the uncertainty (Pavlou et al., 2007). The current study shows that price discount works well to overcome the low review levels. This also emphasizes the importance of providing the price discounts to the customers at the online store when the product review rating is low or the number of reviews is relatively small. As Ba and Pavlou (2002) claimed that positive seller ratings have a strong impact on price premium in electronic markets, this study also confirms that customers' perceived risk plays a significant role in determining their purchase decision. If potential customers would take a risk by purchasing a product with the low review levels, they give a significant weight to the price of the product to compensate the risk.

All in all, current study provides strong evidence that customer reviews mitigate the information asymmetry existing in e-commerce environment. As Pavlou et al. (2007) pointed, e-commerce environment inevitably bears information asymmetry problem between buyers and sellers. To overcome the issue, buyers and sellers attempt various tools. From the analysis of the current study, it is shown that online customer reviews, one of the common e-WOM practices, would be effective way of alleviating the information gaps. This finding would support the use of customer review system in the online retail stores.

As Cordella (2006) and previous literature (Ciborra, 1993; Malone et al., 1986) claimed, it is necessary to approach the information asymmetry in online transactions not by focusing on the presence of the phenomenon but by finding a way to control it. In this regard, this study adds contributions to the area by providing a comprehensive model incorporating not only the direct effects of the customer review factors and the customer incentive factors but also the interaction effects among them. Following the approach, this study sheds light on how to manipulate and control the problems stemming from the information asymmetry at B2C online stores to some degrees.

For e-commerce business practices, this study brings several implications. First, through this study, the importance of product reviews at the online retail store is confirmed. It is desirable that online retail stores provide a well-structured review system in which the customers can post and read product reviews with ease and convenience. By doing so, customers may find more valuable information from the customer reviews and be more willing to shop in the online retail store.

Second, based on the comprehensive model pro-

vided in this study, managers of online retail stores can develop a better strategy to use the incentives for the customers. Different incentives could be provided for the different products. For instance, for the products with relatively few reviews and/or low review ratings, aggressive price discounts could be offered to increase the sales efficiently. Meanwhile, for the products with many reviews and good review ratings, it would be appropriate to offer special shipping than price discount.

The limitations of this study follow. This study is based on the cross-sectional data to reveal the relationship between the relevant factors and the sales at a specific point of time. In a realistic perspective, those variables such as the sales and the number of reviews have a cumulative nature. It is actually revealed that the days from the release date variable is significant across the regression models. This is also related to the issue of causal direction between the number of reviews and the product sales. In this study, it is assumed that the more reviews will lead the more product sales by adopting the number of reviews as an independent variable while adopting the product sales as a dependent variable in regression analysis. However, it might be claimed that more sales affect the number of reviews. As mentioned in the previous section, the number of reviews may represent the popularity of the products. That is, there would be a circular relationship that the more reviews would lead people to buy the product, which increases the probability that the people who purchased the product post reviews on the product. Hence, in order to overcome the issue and improve the study, a longitudinal model that identifies the mutual effect between the number of reviews and the product sales could be used in the future study.

Another issue related to the data is that this study uses sales rank instead of sales volume as the variable of interest. Although the sales rank is based on the sales volume of the products, it might not perfectly represent the actual sales. Given that the sellers are more interested in predicting sales volume or revenue than sales rank, this study cannot provide a full explanation of how the product sales is determined.

In terms of factors included in the research model, this study contains the four variables concerning the online customer reviews and the incentives offered to the potential customers and the four interaction effects between the review factors and the incentive factors. However, it is also possible that interactions exist among the variables in each category. That is, there could be an interaction between the review ratings and the number of reviews. A future study may include the interaction term to investigate whether a high rating combined with a large number of reviews has a synergetic effect or vice versa.

Another limitation is the sample data. Although the online retail store and the product category used in this study is chosen with a careful consideration, this study only focused on a specific online store and a product category. Thus the results of this study might not be replicated in the different context, especially such a product category that is not susceptible to WOM. If future studies are done in various settings and produce similar findings to this study, it would give more generalizability.

Last point to be noted is that the sources of online WOM effect are not only limited to the customer reviews posted to the online store website, but customers also could get information from various sources, such as private forums, third party review sites, social media, etc. Nevertheless, the result of this study shows that the customer reviews in the online store website has significant impact on the sales of the products, which suggests that they are still the main source where the customers gather product information.

Ⅵ. Conclusions

Recently online customer reviews (e-WOM) have gained many interests. There were numerous attempts to understand the mechanisms that the online customer reviews influence the product sales. However, there still exist unexplained parts in the previous literature. By adopting the principal – agent perspective in the e-commerce context, this study tries to test if the customer reviews and the customer incentives are strong factors toward the product sales in online retail stores. In addition, it also tries to find the interactive effect among the customer reviews and the customer incentives. This study gives contributions to the academic area by filling the gaps by providing a comprehensive model incorporating the impact of the online customer reviews and the incentives offered by online retail stores on the product sales at the same time. By doing so, it successfully reveals that both customer reviews and incentives factors are significant for the product sales at the online store. The findings in this study show that the product sales at the online store are significantly influenced by the customers review ratings, the number of reviews, the special shipping offerings, and the price discount. In addition, it also discloses the existence of interactions between customer reviews and incentives factors toward the product sales. Practitioners may utilize these findings at online retail stores when they build strategies to promote product sales by optimizing marketing techniques such as price discounts and/or special shipping offers with considerations of the product reviews.

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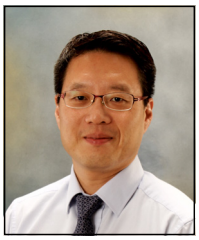

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