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[Sangjae Lee](#) \*

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*Article*

# The Moderating Effect of Online Streaming Contents Service Characteristics on Online Word-of-mouth for Service Performance

Sangjae Lee\*

<sup>1.</sup> Sejong university

**Abstract:** Online streaming contents are creating greater service uncertainty, as consumers need to experience such contents before making a decision to continue to purchase them. Few studies have investigated the interaction between eWOM (online word-of-mouth) and online streaming content service characteristics in online streaming contents' performance and explained the way this interaction can promote service characteristics' role in service performance or remedy service uncertainty attributable to these characteristics. Thus, this paper examines the interaction between eWOM and service (webtoon) characteristics (i.e., author experience, genre (drama or fantasy), completion, transfer to pay service, and publication time (Wednesday)) on online streaming contents' service performance measures such as publication period and gamification of contents. Author experience and genre interact with the number of reviews to affect gamification. The transfer to pay service interacts crucially with review ratings and the number of reviews to influence both publication period and gamification. Online streaming contents completion and publication time are interacting factors with review ratings that affected publication period. Service providers need to cope with service uncertainty in furthering online streaming contents service by considering service characteristics as well as customers' responses through eWOM.

**Keywords:** online streaming contents; eWOM; online streaming contents service; online streaming contents service performance; publication period; gamification likelihood

## 1. Introduction

As a greatly proliferating form of online streaming content, a webtoon is a type of digital comic that was developed in Korea from 2003. Its popularity has gone global with the growing number of smartphone users and fast internet connections. Naver provides global webtoon service called Line Webtoon from 2014. The Korean webtoon market grew from \$137 million in 2013, which is expected to more than double to reach \$880 million in 2018 (Lee, 2016). Furthermore, Bloomberg once published an article introducing a new Korean term "manhwa" by having reported that the manhwa industry in South Korea started expanding than ever, with replacing once-mighty position of Japanese manga very fast (Welsh, 2007). Recently, many genres of online manhwa became so popular among millions of Korean people in the name of webtoons (Lee, 2016). Now publishing webtoons has become a big trend for many talented manhwa authors in Korea, some of whom enjoy celebrity status in the cultural contents market in Korea. The webtoons industry has increased at an enormous rate to over 0.9 billion dollars in Korea in 2015 (KOCCA, 2017) and serves as a lucrative source of business that creates further business by transforming webtoon contents into movies or games.

Online streaming contents service is growing rapidly because its intellectual property can be used easily as a vehicle for multiple types of content, such as movies, dramas, games, and character-related merchandising. Such movie titles as "The Avengers" and "Black Panther," which are based on the cartoon contents Marvel Studios produced, ranked first in the box office in 2012 and 2018, respectively (Box Office Mojo, 2019). Online streaming contents (like webtoons) provide a prototype of intellectual property to test their market potential to be developed into dramas, movies, and games based on their market awareness. A number of commercially successful mobile games in Korea today

are sought from webtoon. Examples include "God of Highschool", "Noblesse", and "Denma", and "The Sound of Your Heart" (Ha and Park, 2017). Korean mobile webtoon app services, such as "Line Manga," "Kakao Piccoma," and "NHN Comico" are ranked in the top seven in Japan, which has a 50 billion-dollar webtoon market (Ha, 2017). In particular, "Line Manga" has approximately 40 million monthly users. Naver webtoon is the number one service platform for webtoons in Korea and has over 4 million subscribers, 70% of whom are in their teens or 20s.

Many of the services online streaming content sites provide are involved with experience goods, which exacerbates their vulnerability to market frictions that originate from information uncertainty from customers' perspectives (Animesh et al., 2010). Customer complaints include inflated savings, low-quality products and services, information deficiencies, and extraneous costs (Bullock, 2012). To cope with diverse market imperfections, online streaming content service sites provide online consumer reviews as electronic word of mouth (eWOM) to remedy asymmetric information (Lee et al., 2015).

Online consumer reviews are posted on third-party websites and consumers post or read reviews left by others who have purchased the same product to help make their purchasing decisions (Elwalda et al., 2016). Online consumer reviews provide a crucial source of product information, and have an important effect on consumers' purchase decisions. The quantity (e.g., number of reviews) and quality (e.g., reviews' helpfulness) of eWOM affect both purchase intention and product sales (Lee and Shin, 2014; Lee and Choeh, 2017). Consumers consult online reviews before deciding to buy a new product or service because they provide product information transparency (Wei and Lu, 2013), and influence repurchase intention (Hsu et al., 2017; Liang et al. 2018).

Given eWOM's importance, previous studies have investigated the way review volume and valence are related to product sales, and have shown that eWOM results in product sales (Cheung et al., 2014; Chevalier and Mayzlin, 2006; Liu, 2006; Duan et al., 2008; Lee and Choeh, 2017; Rui et al., 2013; Zhou and Duan, 2015) or consumer loyalty (Yoo et al., 2013).

In a similar vein to the context of online streaming content service, this study has several objectives. First, we focus on moderators that affect the relation between eWOM and online streaming contents' service performance from the service providers' perspective of service uncertainty. Previous studies have shown contrasting results of eWOM's effect on sales. For example, while Chevalier and Mayzlin (2006), and Chintagunta et al. (2010) showed that review ratings affect product sales significantly, Duan et al. (2008) indicated that they do not. Cheung et al. (2014) suggested that consumer expertise and consumer engagement exert a crucial moderating role in the influence of social information cues on consumer purchase decisions. Zhou and Duan (2015) posited that third-party free sampling and external WOM moderate the feedback relation between internal WOM and sales. While the theory of the adverse selection and asymmetric information between buyer and seller can be used to explain online buyers' reliance on eWOM, factors beyond remedying adverse selection and asymmetric information can explain online streaming content service providers' decision to expand their services.

E-content such as webtoons provide greater service uncertainty, as they are experience goods in nature and consumers need to experience them before making a continued purchase decision. As the impact of eWOM on product sales is greater for less popular products than for well-known products (Zhu and Zhang, 2010), eWOM should be more considered in terms of its effect on online streaming contents performance. Nevertheless, few studies have investigated the interaction between eWOM and online streaming content service characteristics in online streaming contents' performance and explained the way this interaction can promote service characteristics' role in service performance or remedy service uncertainty attributable to these service characteristics. Thus, as previous studies have not examined eWOM's interaction with online streaming contents' service performance based on service providers' perspective of service uncertainty, it is necessary to examine the way eWOM interacts with various contexts of online streaming content service in service performance. We posit that online streaming content service providers' decision to further their service can be based on service characteristics that interact with eWOM to enhance customers' responses or service characteristics that interact with eWOM to reduce online streaming contents'

service uncertainty. The service characteristics relevant to the former include author experience, genre popularity, webtoon completion (including suspension), while the characteristics related to the latter include transfer to pay service and unpopular publication time.

Second, as there are few studies on the way eWOM affects the success of online streaming contents like webtoons, we aim to provide insights specifically into the way moderating factors related to eWOM and webtoons can influence webtoons' success. While eWOM factors have been studied extensively with respect to their effect on product sales or purchase intentions, eWOM's role in online streaming contents' success have been studied less often. Thus, it is necessary to determine eWOM's effect on online streaming content service performance by elucidating different contexts of webtoon service.

As few studies have evaluated online streaming contents' success, we devise measures of webtoons' success, i.e., publication period and likelihood that webtoon contents will be developed as mobile games. Given that such online streaming content as webtoons can be viewed only after consumers agree to subscribe to such content, these success measures reflect these contents' particular aspects specifically.

## 2. e-WOM and Online Streaming Contents Service

Studies of eWOM's effect on online service performance can be divided into two types according to whether product performance is a measure oriented to consumers (product sales, purchasing intention) or online streaming content service providers (e.g., publication period, product functionalities' enhancement). Previous studies have investigated eWOM's effect on product sales in detail (e.g., Chintagunta et al., 2010; Lee and Choeh, 2018; Zhou and Duan, 2015). For example, Chinatagunta et al. (2010) investigated online reviews' influence on designated market area's box office revenues with respect to valence, volume, and variance. Zhu and Zhang (2010) investigated its effect on product sales and found that it is moderated by product and consumer characteristics. Lee et al. (2015) indicated that Facebook "likes" influence sales in social commerce, while product and deal characteristics moderate this influence. Finally, Lee and Cheoh (2018) investigated reviews' average number and rating's influence on box office revenue.

eWOM's effect on the performance or quality of online streaming content services, such as online videos, music, and news, has been studied less well compared to other types of products, such as physical products (Lee and Choeh, 2016; Ghose and Ipeiritos, 2011; Mudabmi and Schuff, 2010) or movies (Chintagunta et al., 2010; Duan et al., 2008). Such online streaming contents as webtoons provide greater service uncertainty because they are experience goods and customers must use them for a certain period to develop attitudes about them that affect their decision to continue to purchase. Service providers also face service uncertainty, in that expanding online streaming contents service will not lead necessarily to customers' positive responses. As this uncertainty has reduced the ability to develop this online business completely into a legitimate market (Lee et al., 2015), feedback systems based on eWOM have appeared as a facilitating medium to increase buyers' confidence in purchasing. Previous studies have suggested further that eWOM affects perceived value, willingness to pay, and purchase intention. Wu et al. (2013) examined eWOM's influence on consumer's willingness to pay by assessing its mitigating effect on product and seller uncertainty. Liang et al. (2018) suggested that eWOM also affects consumers' perceptions of products' value and their repurchase intentions. Further, Chen et al. (2015) studied eWOM's role in the consumer purchase decision-making process. These studies focused on eWOM's effect on consumer-oriented product performance measures, such as sales and purchase intention. However, studies of eWOM's effect on online streaming contents' service performance measures, such as publication period or content enhancement for other businesses (i.e., webtoon gamification) are rare. Accordingly, it is necessary to examine eWOM's influence on online streaming content service provider-oriented performance measures in this context.



### 3. Research Model

Our study examines the way by the interaction between eWOM and webtoon characteristics affects webtoon performance, as represented by publication period and gamification, to enhance customers' responses or reduce online streaming contents' service uncertainty. Previous studies have suggested that eWOM moderates sales or purchase behavior. For example, Zhu and Zhang (2010) indicated that game popularity and player experience play moderating roles in eWOM's effect on the decision to purchase games, while Wu et al. (2013) demonstrated consumer' risk attitudes' moderating role in online user reviews' effect on consumers' willingness to pay. Hu et al. (2014) showed that review ratings exert an indirect effect on sales through sentiments. Further, Lee et al. (2015) studied Facebook likes' contingent influence on product sales based on product and deal characteristics. Lee and Cheoh (2018) also indicated that reviews' helpfulness can affect the relation between eWOM and box office revenues. These previous studies have used the theory of the adverse selection created by the asymmetric information between buyer and seller to understand online consumers' reliance on eWOM. However, online streaming content service providers' decision to further their services can be understood with respect to factors beyond remedying adverse selection and asymmetric information. While previous studies have focused greatly on eWOM's effect on product sales, few studies have yet studied the interaction between eWOM and online streaming content service characteristics on online streaming contents' performance and explicated the way this interaction can enhance service characteristics' influence on service performance or diminish service uncertainty attributable to these service characteristics.

Our study identifies the moderating webtoon characteristics that are related to online streaming content service providers' decision to further their online streaming contents service and past customers' responses presented through eWOM. These webtoon characteristics are factors that play the role either of facilitating eWOM's effect on online streaming contents' service performance or reducing their service uncertainty from the service providers' perspective. Thus, it is necessary to examine the way eWOM interacts with various service contexts to explain online streaming content service providers' further implementation of service.

The service characteristics that interact with eWOM to enhance customer response include author experience, genre popularity, webtoon completion (including suspension), and the service characteristics that interact with eWOM to reduce service uncertainty include transfer to pay service and unpopular publication time. Firstly, author experience can be considered among the influential factors that affect online streaming contents' service expansion and performance. Novotny (2004) showed that Internet experience is related to user persistence, in that the lack of experience results frequently in rapid withdrawal from the Internet as an information source. If a consumer possesses greater Internet experience, s/he tends to have greater confidence in the Internet based on a different perception of online channels' attributes than does an Internet novice (Bart et al. 2005). Further, eWOM's effects on sales are greater in games whose players have greater Internet experience (Zhu and Zhang, 2010). In the context of eWOM and webtoon performance, authors with much webtoon experience can provide greater webtoon performance, be considered persistent in their creation and enhancement, have much experience of being exposed to or interacting with eWOM, and acknowledge the way to adjust webtoons' production extent according to eWOM. eWOM affects authors with greater experience more sensitively and they are likely to create webtoons that have longer publication periods and greater gamification likelihood than other authors with less webtoon experience when positive review ratings and a high number of reviews are provided though review sites.

Hypothesis 1: Increased online reviews (e.g., review ratings, number of reviews) have less influence on webtoon performance when webtoon authors have more experience.

While genre has been used often in the movie literature as an explanatory variable to predict box office revenues (Brewer et al., 2009), the results in studies on the relation between movie genre and box-office revenues are inconsistent (Shon et al., 2014). eWOM's effect on sales also can differ according to genre; viewers of literary genres may prefer "slow" dissemination choices, such as face-to-face conversations, while viewers of non-literary genres may be prone to "fast" dissemination

choices, such as SMS (Koshat, 2012). Zhu and Zhang (2010) posited that eWOM's effect on product sales is becoming greater for lesser-known products than for popular products. However, with respect to genre's effect on webtoon performance, when a webtoon belongs to the two most popular genres, i.e., drama and fantasy, its effect on performance likely will be greater because service providers of webtoons in these genres are likely to have more experience interacting with eWOM, and know how to respond to it to adjust the extent to which they produce webtoons. Thus, eWOM's influence is more pronounced in the popular genres and affects the publication period and gamification likelihood more sensitively than it does in the other genres.

Hypothesis 2: Increased online reviews (e.g., review rating, number of reviews) have less influence on webtoon performance when the webtoon genre is drama or fantasy.

Authors are subject to renewal contracts for every webtoon they publish, and contract renewal is based on their popularity and access traffic. When a webtoon's publication is completed or suspended, the uncertainty with respect to publication contract renewal is very low. However, uncertainty is greater until completion (or suspension) than for other webtoons that are not completed (or suspended), and the uncertainty involved in the deal is related positively to eWOM's effect (Lee et al., 2015). For webtoon service providers, when the publication is suspended or completed, eWOM's effect on webtoon performance is greater, as widespread eWOM represents either the webtoon's high or low popularity among consumers, and it is likely that these webtoons either are completed successfully or suspended because of consumers' lower responses. When webtoon publication is underway and the service provider is still developing its contents in collaboration with the author, eWOM has less effect on webtoon performance, as the story is not completed and consumers are not yet able to recognize its real merits and interesting features. Thus, eWOM's effect on the publication period or gamification is greater for webtoons that have been completed successfully.

Hypothesis 3: Increased online reviews (e.g., review ratings, number of reviews) have a stronger influence on webtoon performance when the webtoon has completed or suspended its publication.

eWOM facilitates social engagement and evaluations of recommendations' quality by reducing social risks (Einsingerich et al., 2015). The low social risk and high transparency eWOM enables can decrease the adverse selection in online commerce. As uncertainty plagues e-commerce's ability to develop completely into a legitimate market, feedback systems have appeared as redeeming mechanisms to strengthen consumers' purchase confidence. Product uncertainty moderates eWOM's effect on sales (Lee et al., 2010), and webtoon service providers perceive more uncertainty in webtoons' success in the results of pay service. Thus, they rely on eWOM to a greater extent to determine further enhancement of webtoon contents than when there is no pay service.

Hypothesis 4: Increased online reviews (e.g., review rating, number of reviews) have a greater influence on webtoon performance when the webtoon has transferred to pay service.

As eWOM's effect on sales differs according to product popularity (Zhu and Zhang, 2010) and uncertainty (Lee et al., 2010), webtoons published on a less popular weekday (such as Wednesday) are likely to provide greater uncertainty with respect to online streaming contents' service performance. Thus, online streaming content service providers consider eWOM's effect seriously when a webtoon is published on a less popular weekday and its effect on webtoon performance becomes greater. Service providers have become more sensitive to consumers' responses by adjusting the extent of publication, and depend on reviewing eWOM to determine the appropriate period until the end of the current episode.

Hypothesis 5: Increased online reviews (e.g., review rating, number of reviews) have a greater influence on webtoon performance when the webtoon is published on the least popular weekday.

Figure 1 and Table 1 present the research model and variables.

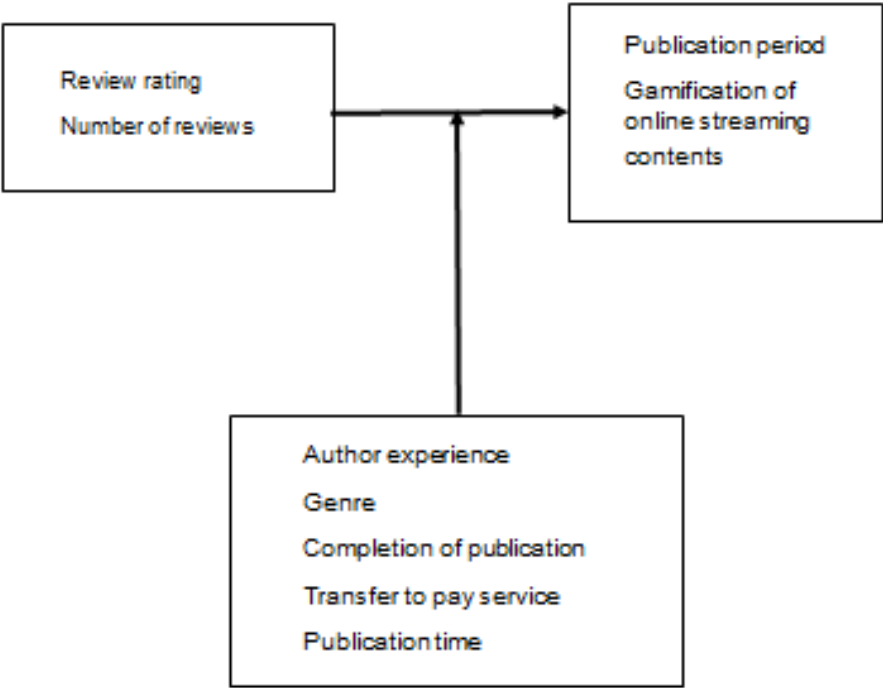


Figure 1. Research Model.

Table 1. eWOM and webtoon related variables.

Category	Variables	Description
Online streaming contents (webtoon) related variables	Author experience (The number of online streaming contents created by author)	This represents the total number of previous online streaming contents posted by author.
	Genre of online streaming contents	This represents the genre of online streaming contents
	Completion of online streaming contents	This represents whether online streaming contents series is completed.
	Transfer to pay service	This represents a dummy variable showing whether the current online streaming contents are transferred to pay service from free service.
	Publication time (Weekday to publish online streaming contents)	This represents a dummy variable showing one of seven weekdays when online streaming contents are published weekly.
	Publication period	This represents the total period of online streaming contents series.
	Gamification	This represents whether online streaming contents is converted into game.
eWOM variables	The rating of the first series in online streaming contents (ep1_rating)	The normalized value of the rating for the first series in online streaming contents from one to ten is used.

The number of rating for the first series in online streaming contents (ep1_numrating)	The normalized value of the number of rating for the first series in online streaming contents is used.
The number of Hearts for the first series in online streaming contents (ep1_numhearts)	The normalized value of the number of Hearts for the first series in online streaming contents is used.
The number of reviews for the first series in online streaming contents (ep1_numreviews)	The normalized value of the number of reviews posted for the first series in online streaming contents is used.
The rate of change in the rating from the first to fourth series in online streaming contents	$ep4\_rating / ep1\_rating$
The rate of change in the number of rating from the first to fourth series in online streaming contents	$ep4\_numrating / ep1\_numrating$
The rate of change in the number of Hearts from the first to fourth series in online streaming contents	$ep4\_hearts / ep1\_hearts$
The rate of change in the number of reviews from the first to fourth series in online streaming contents	$ep4\_numreviews / ep1\_numreviews$
The rate of change in the rating from the first to eighth series in online streaming contents	$ep8\_rating / ep1\_rating$
The rate of change in the number of rating from the first to eight series in online streaming contents	$ep8\_numrating / ep1\_numrating$
The rate of change in the number of Hearts from the first to eight series in online streaming contents	$ep8\_hearts / ep1\_hearts$
The rate of change in the number of reviews from the first to eight series in online streaming contents	$ep8\_numreviews / ep1\_numreviews$

#### 4. Methods

We collected data from 154 webtoons published in “Naver Webtoon” a leading online streaming contents service platform in Korea, from January 1 to November 30, 2017. An automated proprietary tool was implemented to trawl through the Naver Webtoon website and collect the data required to test the hypotheses. The sample’s distribution is shown in Table 2. The total number of webtoons that have completed their final serial publication was 32 (20.8%) (20.8%). Authors renewal contracts with service providers are for an interval of three months and the contract is not renewed when the subscription rate for the corresponding webtoon is low or lacks access traffic.

18 (9.7%) webtoons have been used to create mobile games and their genres are role playing (7.8%), simulation and strategy (1.3%), and action and puzzle (0.6%). 85 webtoons (55.2%) have transferred to pay service. Webtoons’ major genres are drama (26.6%) and fantasy (22.7%), and the least and most popular weekday for publication is Wednesday (9.7%) and Sunday (15.6%). Authors had published 2.5 webtoons on average.



**Table 2.** Distribution of variables.*(a) Webtoon related variables*

	Genre	Frequency	Percent
Number of webtoons created by author	< 1	20	13.0
	1	58	37.7
	2	22	14.3
	3	13	8.4
	4	20	13.0
	$5 \leq \text{Careers} \leq 7$	14	9.1
	$8 \leq \text{Careers} \leq 10$	2	1.2
	$\geq 10$	5	3.2
Genre	Action	20	13.0
	Comic	11	7.1
	Daily life	8	5.2
	Drama	40	26.0
	Fantasy	35	22.7
	Historic	2	1.3
	Horror	3	1.9
	Martial	1	.6
	Romance	19	12.3
	School	6	3.9
	SF	6	3.9
	Thriller	3	1.9
Completion	Uncompleted	122	79.2
	Completed	32	20.8
Transfer to pay service	Transferred	85	55.2
	Not transferred	69	44.8
Posting weekday(s)	Sunday	24	15.6
	Monday	19	12.3
	Tuesday	19	12.3
	Wednesday	14	9.1
	Thursday	20	13.0
	Friday	22	14.3
	Saturday	18	11.7
	Two days	16	10.4
	Five days	2	1.3
Period (weeks)	< 100	72	44.9
	$100 \leq \text{Period} < 200$	41	25.4
	$200 \leq \text{Period} < 300$	20	12.2
	$300 \leq \text{Period} < 400$	11	6.7
	$400 \leq \text{Period}$	10	6
Gamification	Yes	18	11.7
	No	136	88.3

*(b) eWOM variables*

Genre	Minimum	Maximum	Mean
The rating of the first series in online streaming contents (webtoon)	3.83	9.98	9.70

The number of rating for the first series in online streaming contents	6613	239080	48505.26
The number of Hearts for the first series in online streaming contents	2182	86151	22679.60
The number of reviews for the first series in online streaming contents	684	69658	11241.28
The rate of change in the rating from the first to fourth series in online streaming contents	.66	1.22	1.01
The rate of change in the number of rating from the first to fourth series in online streaming contents	.26	1.21	.65
The rate of change in the number of Hearts from the first to fourth series in online streaming contents	.33	1.06	.62
The rate of change in the number of reviews from the first to fourth series in online streaming contents	.12	2.33	.51
The rate of change in the rating from the first to eighth series in online streaming contents	.75	1.29	1.01
The rate of change in the number of rating from the first to eight series in online streaming contents	.20	1.13	.57
The rate of change in the number of Hearts from the first to eight series in online streaming contents	.21	.90	.53
The rate of change in the number of reviews from the first to eight series in online streaming contents	.08	2.70	.47
Overall rating	3.79	9.99	9.75

## 5. Results and Discussions

Tables 3 and 4 provide the multiple regression results with the interaction terms between eWOM and the five moderating variables to explain publication period and gamification, respectively. Five moderating variables were used as controls variables. The models estimated are as follows:

PubPeriod =  $\beta_0 + \beta_1 \text{ RevRating} + \beta_2 \text{ NumReview} + \beta_3 \text{ AutExp} \times \text{RevRating} + \beta_4 \text{ AutExp} \times \text{NumReview} + \beta_5 \text{ Genre} \times \text{RevRating} + \beta_6 \text{ Genre} \times \text{NumReview} + \beta_7 \text{ Compl} \times \text{RevRating} + \beta_8 \text{ Compl} \times \text{NumReview} + \beta_9 \text{ PayService} \times \text{RevRating} + \beta_{10} \text{ PayService} \times \text{NumReview} + \beta_{11} \text{ PubTime} \times \text{RevRating} + \beta_{12} \text{ PubTime} \times \text{NumReview}$

Gamification =  $\beta_0 + \beta_1 \text{ RevRating} + \beta_2 \text{ NumReview} + \beta_3 \text{ AutExp} \times \text{RevRating} + \beta_4 \text{ AutExp} \times \text{NumReview} + \beta_5 \text{ Genre} \times \text{RevRating} + \beta_6 \text{ Genre} \times \text{NumReview} + \beta_7 \text{ Compl} \times \text{RevRating} + \beta_8 \text{ Compl} \times \text{NumReview} + \beta_9 \text{ PayService} \times \text{RevRating} + \beta_{10} \text{ PayService} \times \text{NumReview} + \beta_{11} \text{ PubTime} \times \text{RevRating} + \beta_{12} \text{ PubTime} \times \text{NumReview}$

PubPeriod: publication period; RevRating: review rating; NumReview: the number of review  
AutExp: author experience; Compl: completion of publication; PayService: transfer to pay service

The ten interaction terms are included to test the interaction between eWOM (review rating and number of reviews) and five webtoon characteristics for publication period and gamification. For example, the interaction between author experience and review rating, and between author experience and number of reviews, indicates that eWOM's effect is more pronounced when authors have considerable experience than when they have little experience.

Author experience and genre interact with the number of reviews to affect gamification. The transfer to pay service interact crucially with review rating and the number of reviews and affect both publication period and gamification. Webtoon completion and publication time interact with review rating to affect publication period. Thus, hypothesis 3 is supported and hypotheses 1, 2, 4, and 5 are supported in part, as webtoon characteristics interact either with review rating or the number of reviews to affect publication period or gamification. The study results provide online streaming content service providers with specific information and practical insights into the way webtoon characteristics can affect further webtoon performance mediated by eWOM. To increase publication period, webtoon service providers need to consider eWOM (review rating) as an important condition of consumer response when webtoons intend to be transferred to pay service, or webtoons are completed, and are published on less popular weekday. When webtoons are transferrable to pay service, or published on less popular weekday, service uncertainty increases and review rating should be monitored to reduce service uncertainty which transfer to pay service and publication on less popular day create before making a decision on expanding publication. When online streaming contents are completed or suspended, the expansion of addition publication is greatly depended on review rating to predict and determine customer response to the possible future expanded online streaming contents.

For webtoon gamification, service providers should evaluate eWOM (the number of reviews) when they are using the experienced authors, popular genres or adopting transfer to pay service. The number of reviews should be monitored to evaluate customers' responses before making a decision for expanding webtoon services to other business such as games when they are using experienced authors, popular genres or transfer to pay service. Experienced authors, popular genres are requiring to assess the number of reviews for enhancing the already stable customer response for these online streaming contents, while transfer to pay service is demanding monitoring of the number of reviews for reducing service uncertainty which transfer to pay service may create. This interaction between author experience and genre and the number of reviews can enhance the influence of author experience and genre on gamification.

**Table 3.** Results of regression analysis for the first period (dependent variable = publication period)

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Variables	Standard beta	Standard error	t value	p-value
Review rating	-.051**	102.305	-2.006	.047
The number of reviews	-2.117	.003	-.227	.821
Review rating X Author experience	2.206	19.094	.601	.549
The number of reviews X Author experience	.244*	.000	1.783	.077
Review rating X Genre	1.107	41.811	.702	.484
The number of reviews X Genre	.039	.002	.217	.829
Review rating X Completion of publication	6.687**	94.941	2.352	.020
The number of reviews X Completion of publication	.207	.004	.941	.348
Review rating X Transfer to pay service	7.918**	90.201	2.341	.021
The number of reviews X Transfer to pay service	.442**	.002	2.531	.012
Review rating X Publication time	3.726*	94.899	1.856	.066
The number of reviews X Publication time	.033	.004	.277	.782

F value = 5.06, *p* = 0.000.

**Table 4.** Linear probability model analysis results for the first period (dependent variable = gamification) \* *p* < 0.1, \*\* *p* < 0.05, \*\*\* *p* < 0.01.

Variables	Standard beta	Standard error	t value	p-value
Review rating	-1.425**	.264	-2.095	.038
The number of reviews	-.459*	.000	-1.951	.053
Review rating X Author experience	3.613	.049	.941	.349
The number of reviews X Author experience	.350**	.000	2.449	.016
Review rating X Genre	1.114	.108	.676	.500
The number of reviews X Genre	.410**	.000	2.196	.030
Review rating X Completion of publication	6.311**	.245	2.122	.036
The number of reviews X Completion of publication	.181	.000	.787	.433
Review rating X Transfer to pay service	6.460**	.233	1.825	.070
The number of reviews X Transfer to pay service	.533***	.000	2.923	.004
Review rating X Publication time	3.105	.245	1.478	.142
The number of reviews X Publication time	.102	.000	.812	.418

F value = 3.93, *p* = 0.000

6. Conclusions and Implications

While the literature on online reviews and ratings’ effect on product sales is extensive, studies on eWOM that have centered on its effect on online streaming contents’ service performance measures are lacking. Thus, this paper examines eWOM’s interaction with webtoon characteristics—i.e., author experience, webtoon genre (drama or fantasy), webtoon completion, transfer to pay service, and publication time (Wednesday)—on webtoon contents’ publication period and gamification. Both webtoon completion and publication time interact with review rating and affect publication period, and author experience and genre interact with the number of reviews to affect gamification. The transfer to pay service interact importantly with review rating and the number of reviews and affect both publication period and gamification. These results provide insights into these interacting factors’ roles to further our understanding of the relation between eWOM and webtoon performance.

6.1. Implications for Researchers

Although research interest has focused largely on eWOM’s influence on product sales and purchasing behavior, few studies have yet examined its interactive effect with online streaming contents’ service characteristics on online streaming contents’ performance to determine the way this effect can enhance service characteristics’ influence on service performance or reduce service uncertainty attributable to these characteristics. While research interest increasingly has targeted eWOM’s effectiveness in online review sites, few studies yet have been devoted to webtoon characteristics’ moderating effect in the relation between eWOM and webtoon performance from the online streaming content service providers’ perspective of service uncertainty. While previous studies have suggested that eWOM affects product sales on the basis of the customer network base

eWOM requires, and quality uncertainty frameworks, this paper showed online streaming content service providers' reliance on eWOM to use the existing network base to determine the further expansion of service. Previous studies are silent on the way that contextual factors specific to online streaming contents affect the relation between eWOM and webtoon performance from the providers' perspective. Our theoretical approach offers information systems scholars improved insights into the contexts in which webtoon suppliers use eWOM to extend webtoon publications further and develop them into game services.

Our study suggests the way the interaction between eWOM and webtoon characteristics influences webtoon performance measured by publication period and gamification to facilitate customers' responses (in the case of author experience, genre, and webtoon completion) or diminish service uncertainty (in the case of transfer to pay service and publication time). These moderating webtoon characteristics are factors that serve either to enhance eWOM's influence on service performance or reduce service uncertainty from the online streaming content service providers' perspective. Based on social engagement frameworks, the paper provides theoretical explanations of suppliers' motivation to use online webtoon reviews in various contexts of webtoon characteristics, such as author experience, genre, transfer to pay service, publication completion, and publication time.

## 6.2. Implications for Practitioners

Given that webtoons' success ultimately should be determined by the extent to which the webtoon is published, seen by customers, and expanded to other businesses, such as games, webtoon service providers should design their services so they may adjust contextual features to focus on the interaction between such factors and eWOM. Webtoon service providers who operate in online review sites should focus on online streaming contents' social validation and promote eWOM's volume and valence proactively according to online streaming contents' characteristics. For example, webtoon service platform providers should account for and adjust author experience, webtoon genre (drama or fantasy) and completion, transfer to pay service, and publication time when developing online streaming contents, and encourage users to log-in to their service accounts and participate in social interactions. To promote eWOM's effect on webtoon performance, service providers might consider adjusting the webtoon characteristics listed immediately above in such a way that eWOM affects publication period and gamification positively. online streaming contents such as webtoons are causing service providers greater service uncertainty, as customers must experience these contents before deciding to subscribe to the service. Thus, service providers need to cope with service uncertainty and further online streaming content service by accounting for service characteristics as well as customers' responses through eWOM.

Our study suggests that online streaming content service providers should consider author experience, genre popularity, and webtoon completion (including suspension), all of which interact importantly with eWOM to enhance customers' responses. Further, service providers should consider transfer to pay service and unpopular publication time that interact with eWOM to reduce online streaming contents' service uncertainty. Service providers with experienced authors who produce popular genres or offer pay service should consider promoting eWOM to a greater extent. They also should use ways to promote favorable evaluations of their offerings proactively based on past subscription performance, and change their webtoon characteristics flexibly to produce more favorable responses to their online streaming contents.

**Data Availability:** The sample data is available upon the review of the request.

**Conflicts of Interest:** The authors declare no conflict of interest.

## References

1. Animesh, A.; Ramachandran, V.; and Viswanathan, S. (2010), Research note—quality uncertainty and the performance of online sponsored search markets: An empirical investigation, *Information Systems Research*, 21(1), 2010, 190–201.



2. Box Office Mozo (2019), Yearly Box Office, <https://www.boxofficemojo.com/yearly/>, retrieved 2019-01-20, 8:00 P.M. Pacific Time.
3. Brewer, S.M., Kelley, J.M., and Jozefowicz, J. J. (2009), A blueprint for success in the US film industry, *Applied Economics*, 41, 589–606.
4. Bullock, D. (2012), 5 reasons customers are turning againstgroupon. Minyanville, <http://www.minyanville.com/sectors/consumer/articles/groupon-complaints-groupon-customer-service-grpn/3/21/2012/id/40010?refresh=1>.
5. Chen, C.-H., Nguyen, B., Klaus, P.P., and Wu, M.S. (2015), Exploring Electronic Word-of-Mouth (eWOM) in The Consumer Purchase Decision-Making Process: The Case of Online Holidays – Evidence from United Kingdom (UK) Consumers, *Journal of Travel & Tourism Marketing*, 32(8), 953-970.
6. Cheung, C.M.K., Xiao, B.S., and Liu, I.L.B. (2014), Do actions speak louder than voices? The signaling role of social information cues in influencing consumer purchase decisions, *Decision Support Systems*, 65, 50–58.
7. Chevalier, J.A. and Mayzlin, D. (2006), The effect of word of mouth on sales: online book reviews, *Journal of Marketing Research*, 43(3), 345-354.
8. Chintagunta, P.K., Gopinath, S. and Venkataraman, S. (2010), The effects of online user reviews on movie box office performance: accounting for sequential rollout and aggregation across local markets, *Marketing Science*, 29(5), 944–957.
9. Duan, W., Gu, B. and Whinston, A.B. (2008), Do online reviews matter? An empirical investigation of panel data, *Decision Support Systems*, 45(4), 1007-1016.
10. Eisingerich, A.B., Chun, H.H., Liu, Y., Jia, H., and Bell, S.J. (2015), Why recommend a brand face-to-face but not on Facebook? How word-of-mouth on online social sites differs from traditional word-of-mouth, *Journal of Consumer Psychology*, 25(1), 120–128.
11. Elwalda, A., Lu, K., and Ali, M. (2016), Perceived derived attributes of online customer reviews, *Computers in Human Behavior*, 56, 306-319.
12. 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*, 23(10), 1498-512.
13. Ha, J.Y. and Park, J.W. (2017), A case study of mobile game using webtoon as original content, *Journal of the Korean Society for Computer Game* 30(3), 35-43.
14. Hsu, C.-L., Yu, L.-C., and Chang, K.-C. (2017), Exploring the effects of online customer reviews, regulatory focus, and product type on purchase intention: Perceived justice as a moderator, *Computers in Human Behavior*, 69, 335-346.
15. 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 online review sentiments on product sales, *Decision Support Systems*, 57, 42–53.
16. KOCCA (Korea Creative Content Agency), "2016 Contents Industry Whitepaper," 66-67, Sep. 2017 (in Korean) (available at <http://www.kocca.kr/cop/bbs/view/B0000146/1834426.do?statisMenuNo=201826#>).
17. Ha, S.-Y. (2017), "Korean firms succeed in Japan's webtoon market", November 27, Korea Joongang Daily, accessible at <http://koreajoongangdaily.joins.com/news/article/article.aspx?aid=3041255>
18. Koschat, M.A. (2012), The impact of movie reviews on box office: media portfolios and the intermediation of genre, *Journal of Media Economics*, 25, 35–53.
19. Lee, E.-J. and Shin, S.Y. (2014), When do consumers buy online product reviews? Effects of review quality, product type, and reviewer's photo, *Computers in Human Behavior*, 31, 356–366.
20. Lee, K., Lee, B., and Oh, W. (2015), Thumbs up, sales up? The contingent effect of Facebook likes on sales performance in social commerce, *Journal of Management Information Systems*, 32(4), 109–143.
21. Lee, S. and Choeh, J.Y. (2018), The interactive impact of online word-of-mouth and review helpfulness on box office revenue, *Management Decision*, 56(4), April 2018, 849-866.
22. Lee, W.-Y. (2016). "Korean webtoons make big strides in global comics market", The Korea Herald, 16 Aug, retrieved 2019-01-20 <http://www.theinvestor.co.kr/view.php?ud=20160816000937>
23. Liang, L.J., HS Chris Choi, HS C., and Joppe, M. (2018), Understanding repurchase intention of Airbnb consumers: perceived authenticity, electronic word-of-mouth, and price sensitivity, *Journal of Travel & Tourism Marketing*, 35(1), 73-89.
24. Liu, Y. (2006), Word of mouth for movies: its dynamics and impact on box office revenue, *Journal of Marketing*, 70(3), 74-89.
25. Mudambi, S.M. and Schuff, D. (2010), What makes a helpful online review? A study of customer reviews on Amazon.com, *MIS Quarterly*, 34(1), 185-200.
26. Rui, H., Liu, Y., and Whinston, A. (2013), Whose and what chatter matters? The effect of tweets on movie sales, *Decision Support Systems*, 55, 863–870.
27. Shon, J.-H., Kim, Y.G., and Yim, S.-J. (2014), Classifying movies based on audience perceptions: MTI framework and box office performance, *Journal of Media Economics*, 27, 79–106.
28. Wei, P.-S. and Lu, H.-P. (2013), An examination of the celebrity endorsements and online customer reviews influence female consumers' shopping behavior, *Computers in Human Behavior*, 29, 193–201.

29. Welsh, D. (2007), Forget Manga: Here's Manhwa, *Bloomberg.com*, retrieved 2019-01-20.
30. <https://www.bloomberg.com/news/articles/2007-04-23/forget-manga-dot-heres-manhwabusinessweek-business-news-stock-market-and-financial-advice>
31. Wu, J., Wu, Y., Sun, J., and Yang, Z. (2013), User reviews and uncertainty assessment: A two stage model of consumers' willingness-to-pay in online markets, *Decision Support Systems*, 55, 175–185.
32. Yoo, C.W., Sanders, G.L., and Moon, J. (2013), Exploring the effect of e-WOM participation on e-Loyalty in e-commerce, *Decision Support Systems*, 55, 669–678.
33. Zhou, W. and Wenjing Duan, W. (2015), An empirical study of how third-party websites influence the feedback mechanism between online Word-of-Mouth and retail sales, *Decision Support Systems*, 76, 14-23.
34. Zhu, F. and Zhang, X. (2010), Impact of online consumer reviews on sales: The moderating role of product and consumer characteristics, *Journal of Marketing*, 74, 133–148.