The Effect of Diffusion of Online Culture Content on Medical Tourism: Analysis of Keyword

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The objective of this study was to evaluate the effects of consumers' Internet search behavior regarding online culture content on medical tourism. For this study, we categorized online culture content into dramatic (drama) and popular (pop) culture. We analyzed the influence of online culture content on medical tourism and the effect of innovation and imitation on the diffusion process. The following major findings and implications were identified: (1) an analysis of search behavior revealed that online culture content influenced medical tourism, (2) evaluations of online culture content differed according to type of content (i.e., pop culture was a more important influence than drama culture on consumers' medical tourism intentions), (3) pop culture content supported the diffusion of medical tourism for a longer period of time compared with drama culture content, and (4) in contrast to the innovation coefficient, the imitation coefficient of pop culture was higher than that of drama culture. The findings of this study may provide a better understanding of the effect of consumers' search behavior on the global diffusion of medical tourism. To advance the knowledge obtained in this study, future studies should focus on medical tourism products and marketing.

Keywords: *medical tourism, culture content, diffusion, online, keyword analysis*

1. Introduction

Medical tourism is 'travel with the aim of improving one's health'(Bookman and Bookman, 2007). Medical tourism has recently increased in developing countries due the advantages of high-quality service at low cost. So it has developed rapidly along with the globalization of the health and tourism industry, and triggered many countries to participate in this field (Connell, 2006). According to the Medical Tourism Association data, Korea is ranked 10th in the world in tourism, including medical tourism (Table 1). And the size of Korea travel spend is expected to reach $ 34.3 billion in 2025.

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Table 1. Top 10 Countries in Travel Spend

Rank	Country	2015 (USD billion)	2025 (USD billion)	Percent Increase
1	China	$137.0	$255.4	86%
2	United States of America	$101.0	$134.1	33%
3	Germany	$74.4	$97.6	31%
4	United Kingdom	$61.3	$96.9	58%
5	Russia Federation	$22.6	$49.1	118%
6	Hong Kong, China	$26.7	$47.4	78%
7	Singapore	$22.5	$44.9	99%
8	France	$37.4	$43.9	17%
9	Brazil	$18.3	$37.8	106%
10	South Korea	$21.1	$34.3	63%

. Medical Tourism Association Report. This chart depicts travel spend by househoulds earning more than $20,000 per year in the top 10 countries with the higest projected spend in 2025.

The Korea Health Industry Development Institute reported in 2012 that 159,464 patients from 188 countries visited Korea in 2012, 32,503 of those patients were mainly Chinese (Medical Tourism Association, 2014). South Korea's medical travel income has increased steadily on the back of the advancement of medical technology and regional governments' efforts to attract overseas patients (Asia Medical Tourism Analysis and Forecast, 2015). In the case of Chinese which Korean television shows and movies are wildly successful, popular culture has had an influence. Some Chinese plan to see the sights featured in their favorite Korean TV show, buy clothes like those worn by the show's female star, ask for the same nose as famous Korean actoress (The New York Times, 2014).

According to the Korea tourism organization (KTO), medical tourism has become important in several countries, including Thailand, Singapore, Malaysia, India, and South Korea.

Additionally, foreigners have expressed an increased preference for K-Pop and Korean drama, which represent the Hallyu (Korean Wave). For example, "Gangnam Style," a recent song, spread worldwide, enhancing Korea's image. Yu (2012) reported that Hallyu cultural items such as pop songs, movies, and television dramas may be associated with foreigners' (e.g., Chinese) increased demand for Korean cosmetic or plastic surgery procedures. Specifically, in China, the rise of an affluent class and an infatuation with Hallyu culture, from pop music to drama, have spurred a sharp growth in South Korean medical tourism, mainly in the field of cosmetic surgery (Reuter, 2011). It is believed that this increased interest in cosmetic surgery stems from interest in Hallyu stars, which has impacted Korean culture including drama, music, amd movies. With Korea's excellent tourist infrastructure, foreigners come to experience the Korean culture and, as they do, are exposed to its advanced medical technology.

Typically, consumers interested in medical tourism search for related information on the Internet. The searching behavior is stored on computers and collected in the form of big data. Research in the field of economic forecasting has shown that trends reflected in the increasing or decreasing volumes of house-related search queries on Google are a more accurate predictor of house sales in the next quarter than are the forecasts generated by real estate economists (Lohr, 2012).

Therefore, in this study we investigated the effect of cultural diffusion on medical tourism by analyzing big data. First, we analyzed the influences of online culture content on medical tourism. To this end, we categorized online culture content into dramatic (drama) and popular (pop). Second, we analyzed the influence of innovation and imitation coefficients on the diffusion model for each online content category (drama and pop).

2. Literature Review

Medical Tourism. There are several conflicting views reagrding health tourism. Medical

tourism is defined in various ways such as 'travel for recovery (Tourism Research and Marketing, 2006)', 'the sale of high-tech medical care to foreigners has come to be called medical or health tourism (Bookman and Bookman , 2007)', 'common treatments for which patients travel abroad are: cosmetic surgery, dentistry, cardiology and cardiac surgery, orthopaedic surgery, bariatric surgery, and reproductive system treatments (Horowitz, et al., 2007)', 'travel across international borders as an important criterion to be considered a medical tourist (Reddy, et al., 2010)' and so on. According to its definition, health tourism is composed of medical and wellness tourism. This defnition indicates that medical tourism is a subset of health tourism (Smith & Puczko, 2009). Medical tourism refers to cases in which medical intervention is required (Connell, 2006) and can be broadly defined as travel undertaken for health reasons (Ross, 2001).

Research related to medical tourism is classified as tourist characteristics and job satisfaction, convergence with other industries such as ubiquitous, culture, welfare, and etc in Korea. For example, Lee, et al. (2015) attempted to identify the factors Chinese selecting Korea as a medical tourism destination and the desired medical services. Through this study, they want to provide basic data for the development of medical tourism products targeting Chinese. Kim and Yang (2016) conducted to identify job characteristics, and levels of job burnout and job satisfaction of medical tourism coordinators, and also to investigate factors impacting the job satisfaction of medical tourism coordinators. Song, et al. (2013) attempted to propose the u-health ploicy to promote medical tourism industry.

Medical tourism and Culture. The importance placed on aesthetic treatments by Chinese tourists may be due to Hallyu. It's success in China has likely increased the demand for Korean cosmetic and plastic surgery procedures (Yu & Ko, 2012). The broader context of Korean popular culture, have resulted in Korea becoming a cosmetic surgery destination for several parts of east and south-east Asia (Connell, 2011a, 2013; Yu & Ko, 2012). In other words, the global spread of Korean popular culture centering on pop and movie stars creates a desire to resemble the star. From this, Food Hallyu, Medical Hallyu, Tourism Hallyu have emerged (Lee & Limbu, 2011).

Keyword Analysis. Keyword analysis is possible through text mining in sentences. Text mining is a process or technique for finding new and useful information in unstructured text data. It is an automatic technique for categorizing and structuring text and extracting useful patterns (Hotho, et al., 2005). Text analysis is possible through keyword extraction, also called textual network analysis. Text network analysis has many advantages in that it not only extracts the concepts shown in text but also can grasp the relationship with other concepts and can visualize the relationship between concepts. The process of text mining is divided into data processing and data analysis. Data processing corresponds to data collection and preprocessing. Data analysis is a text analysis that extracts meaningful information from text (Hotho, et al., 2005).

In general, the text data containing the keyword is big data. Big Data is a loosely defined term used to describe data sets so large and complex that they become difficult to work with using standard statistical software. The rise of digital and mobile communications has made the world more connected, networked, and traceable and has typically lead to the availability of large-scale data sets (Raine & Wellman, 2012). For example, Google searches, Facebook posts, and Twitter messages make it possible to measure behavior in real time (Lohr, 2012). Search patterns are the result of thousands of decisions made by company programmers and millions of consumers worldwide (Lazer, 2014).

Diffusion model. In 1969, Bass explained the product diffusion phenomenon using a diffusion model with innovation and imitation coefficients. In this model, diffusion size (St) at time t is influenced by the size of the market potential (N), diffusion size at time t-1 (Yt-1), external impact of the mass media (p: innovation factor), and the internal influences

of word-of-mouth (q: imitation factor).

The Bass model is represented by the following equation (Bass, 1969):

$$S_t = (p + q\frac{Y_{t-1}}{N})(N - Y_{t-1}) \tag{1}$$

Where S_t is noncumulative adoptions at time t, Y_{t-1} is cumulative adoptions at t-1, N is market potential, p is the coefficient of external influence, and q is the coefficient of internal influence.

t^*(the time at which the noncumulative adoption is maximum or inflection time) and t^{**}(the time at which the rate of adoption is maximum or take-off time) were extracted from a previously published Bass model. In other words, take-off time means the time point at which the slope increases sharply on the cumulative diffusion curve, and inflection time means the time point at which the diffusion size is largest on the non-cumulative diffusion curve.

Those parameters were represented by the following equations (Lim et al., 2003):

$$t^{**} = -\frac{1}{p+q}\ln[(2+\sqrt{3})\frac{p}{q}] \tag{3}$$

$$t^* = -\frac{1}{p+q}\ln\frac{p}{q} \tag{4}$$
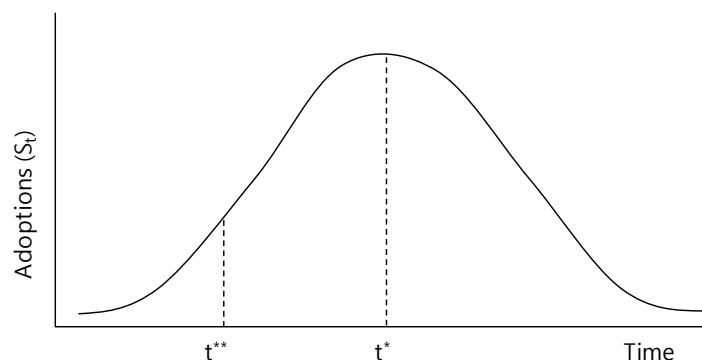
Figure 1. Bass Diffusion Curve

This model will be used to investigate the diffusion phenomenon of medical tourism and online culture content. Furthermore, we can use this method to evaluate the effect of these variables on medical tourism.

3. Research Methodology

Data. The purpose of this study was to examine the influences of online culture content on medical tourism. We collected the weekly search volume data of keywords related to each variable from year 2011 to 2015(261 weeks) using the Google search engine. We conducted keyword analysis previously for our study.

This analysis revealed that the keyword 'Korea plastic surgery' was related to other keywords, including K-Pop and K-Pop star such as 'snsd' (SoNyeoSiDae: Girl group's name in Korean pop market), 'exo' (Boy group's name in Korean pop market), 'yoona' (pop star's name), 'girls generation' (Girl group's name in Korean pop market), and so on. Also, the keyword 'Korea plastic surgery' was related to other keywords, including K-Movie star such a 'miss korea', 'park min young', lee min ho', 'kim soo hyun', 'park shin hye'. More recently, several Korean pop stars and actors/actresses have been changing

their fields. And the keyword 'Korea plastic surgery' was related to other keywords, including Korea plastic surgery industry such as 'cosmetic surgery', 'double eyelid surgery', 'plastic surgery statistics', 'jk plastic surgery' (plastic surgery hospital's name in Korea), 'bk plastic surgery' (plastic surgery hospital's name in Korea), and so on.

Finally, 'Korean plastic surgery' was related to 'Korean beautiful stars' or specific hospital name such as 'jk plastic surgery' and 'bk plastic surgery', which are famous Korean plastic surgery hospitals. In other words, 'Korea plastic surgery' keyword was classified into three categories: K-Pop, K-Movie, and Medical tourism (Table 2). These results suggest that Korean pop culture is related to medical tourism. So, this study attempted to analyze the effect of culture content on medical tourism based on the result of keyword analysis that medical tourism is related to culture content.

Table 2. Classification of Related Keyword on 'Korea Plastic Surgery'

Category	Top	Rising
K-Pop	Kpop snsd exo yoona	Kpop kim jong un exo Yoona girls generation
K-Movie	miss korea park min young lee min ho	miss korea park min young kim soo hyun park shin hye
K-Plastic Surgery (Medical tourism)	cosmetic surgery plastic surgery statistics double eyelid surgery jk plastic surgery cinderella plastic surgery grand plastic surgery jw plastic surgery bk plastic surgery	double eyelid surgery jk plastic surgery grand plastic surgery jw plastic surgery banobagi plastic surgery

Measures and Research Model. In order to analyze the impact of culture content on medical tourism, the following variables were measured by operational definition. The search volume of the following variables were used in this study: 'Korea plastic surgery' (KPS), 'K-Pop' (KPOP), and 'Korean drama' (KDRAMA). The search volume of 'Korea plastic surgery' keyword was operationally defined as Korea medical tourism (dependent variable). And, the search volume of 'K-Pop' and 'Korean drama' keywords were operationally defined as Korean culture content respectively (independent variable).

To test the effect of KPOP and KDRAMA on KPS, we used the following regression model:

$$KPS_t = \alpha + \beta 1 \cdot KPOP_t + \beta 2 \cdot KDRAMA + \varepsilon \qquad (2)$$

From this regression model, we attempted to investigate the effect of Korean culture (KPOP, KDRAMA) on Korean medical tourism (KPS). In detail, we conducted to explore whether culture content types affect the diffusion of medical tourism, and if then, what culture types are more important for the diffusion of medical tourism.

On the other hand, to explore the effect of diffusion penominon of KPOP and KDRAMA on KPS, we extracted t* and t** from a previously published Bass model (Lim et al., 2003). From this analysis, the effect of KPOP and KDRAMA on medical tourism was deduced in the side of diffusion curve. The reason for the estimation is that the diffusion pattern is a wave form or an irregular form in the actual condition. It was also intended to measure on the same basis.

4. Results

Descriptive Analysis. Search volume patterns for three keywords for web and image categories are shown in Figures 2 and 3, respectively. Values range from 0 to 100, where 100 is the highest week, 50 is half the level of the maximum, and 0 is less than 1% of the maximum. In the pattern analysis of keyword for web category, KPOP and KDRAMA showed similar diffusion patterns. Although there was a difference in search volume, the patterns of KPS and two types of culture content seemed to be relatively somewhat similar. For more accurate pattern identification, it is needed additional analysis such as correlation analysis. Overall, the KPS is showing a downward trend, while the KPOP and KDRAMA mark at a constant level relatively.
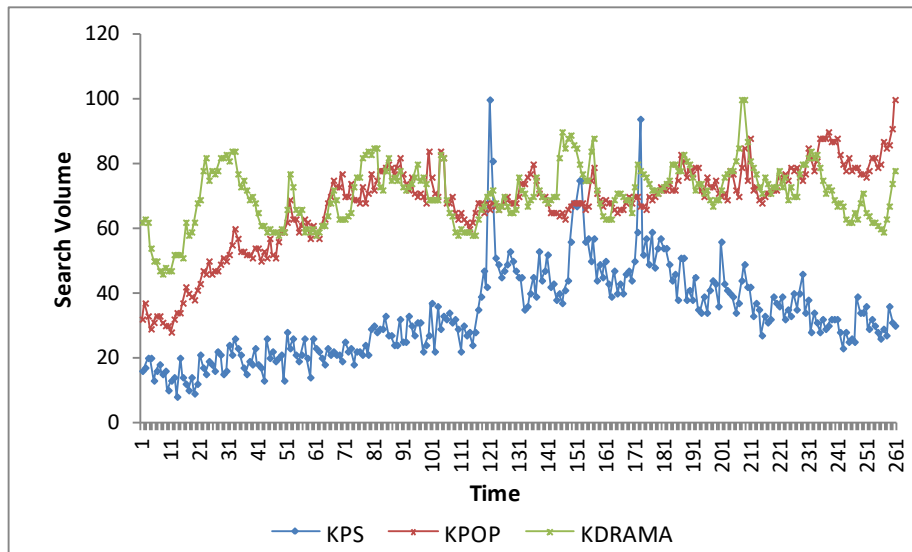
Figure 2. Search Volume Patterns for the Web

On the other hand, in the pattern analysis of keyword for image category, KPS, KPOP, and KDRAMA have more similar patterns than web category. Overall, the KPS and KDRAMA are showing a downward trend.
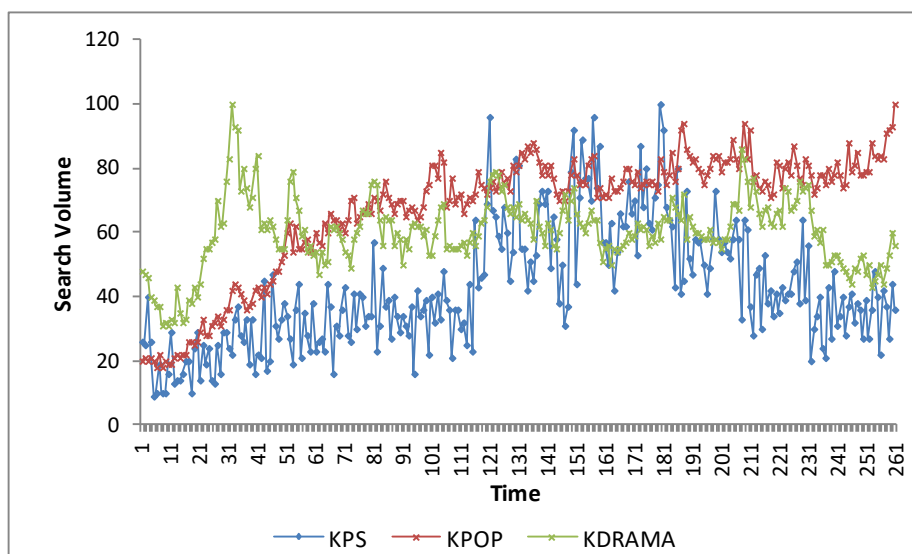
Figure 3. Search Volume Patterns for Images

Table 3 presents the correlation and statistical analyses. Independent variables were correlated to each other, but according to the variance inflation factor test, no multicollinearity was observed. The weekly means for KPS, KPOP, and KDRAMA for the web category were 33.4, 67.3, and 70.6, respectively. The weekly means for KPS, KPOP, and KDRAMA for the image category were 42.6, 67.1, and 60.1, respectively. These results indicate that there was a correlation between KPS, KPOP and KDRAMA in each category of web and image respectively.

Table 3. Correlation and Statistical Analyses

Variables	Web			Image		
	KPS	KPOP	KDRAMA	KPS	KPOP	KDRAMA
KPS	1			1		
KPOP	.428***	1		.581***	1	
KDRAMA	.389***	.478***	1	.292***	.325***	1
Mean	33.4	67.3	70.6	42.6	67.1	60.1
SD	14.2	13.4	9.2	19.1	19.2	11.0

***$p < 0.001$, SD: standard deviation

Effect of Online-Content on Medical Tourism. Based on the previous pattern analysis and correlation analysis, we confirmed the relationship between culture content and medical tourism. To test the effect of online content on medical tourism we conducted a regression analysis using the aforementioned model, and we observed positive effects of KPOP and KDRAMA on KPS for the web (Table 4). Compared with KDRAMA (Korean drama), KPOP (Korean pop) had a greater influence on KPS (Korea plastic surgery, *i.e.*, Korea medical tourism). Our results suggest that pop culture contributes to consumers' medical tourism more than television drama shows.

Table 4. The Effect of Online Culture Content on KPS for the Web

Variables	Non-standardized coefficients		Standardized coefficients	t-value	p-value
	B	S.E	β		
(Constant)	-15.504	6.478	0.000	-2.39*	0.018
KPOP	0.389	0.060	0.483	6.45***	0.000
KDRAMA	0.220	0.097	0.169	2.25*	0.025
F-value	39.70***				
Adjusted R^2	0.332				

* significant at .05 level, *** significant at .001 level

On the other hand, we observed positive effects of KPOP on KPS for the image. But KDRAMA did not influence on KPS (Table 5). This suggests that the activities of KPOP are more important for the diffusion of medical tourism.

Table 5. The Effect of Online Culture Content on KPS for Image

Variables	Non-standardized coefficients		Standardized coefficients	t-value	p-value
	B	S.E	β		
(Constant)	13.226	6.233	0.000	-2.12*	0.035
KPOP	0.495	0.056	0.587	8.79***	0.000
KDRAMA	0.041	0.104	0.027	0.40	0.692
F-value		41.9			
Adjusted R^2		0.344			

* significant at .05 level, *** significant at .001 level

Why does not drama affect diffusion of medical tourism for the image category? Since KPS can be affected by the former period of KDRAMA, the following analysis was performed. As a result, we observed positive effects of KDRAMA for the image category too.

Table 6. The Effect of Former Period of Online Culture Content on KPS for Image

Variables	Non-standardized coefficients		Standardized coefficients	t-value	p-value
	B	S.E	β		
(Constant)	-6.936	5.630	0.000	-1.23	0.219
KPOP	0.541	0.053	0.541	10.22***	0.000
KDRAMA t-1	0.218	0.092	0.126	2.38*	0.018
F-value		69.5			
Adjusted R^2		0.346			

* significant at .05 level, *** significant at .001 level

The results of parameter estimations for p (innovation coefficient), q (imitation coefficient), and t^* (inflection), and t^{**} (take-off time) are presented in Table 6 and 7. The inflection point of KPOP is longer than that of KDRAMA, which reflects the diffusion of KPS for a longer time. The innovation coefficient of KDRAMA is higher than that for KPOP. In contrast, the imitation coefficient of KDRAMA was less than that for KPOP.

Table 6. Parameter Estimations for the Web

	p	q	t*	t**
KPS	0.00281	0.02575	77.63	31.52
KPOP	0.00152	0.03240	90.20	51.37
KDRAMA	0.00353	0.02280	70.85	20.83

Table 7. Parameter Estimations for Image

	p	q	t*	t**
KPS	0.00005	0.05120	135.65	109.95
KPOP	0.00093	0.03470	101.61	64.65
KDRAMA	0.00380	0.02330	66.92	18.32

The results imply that Korean drama help to take off the diffusion of Korea plastic surgery (medical tourism) and then K-POP lead it. And, this phenomenon is similar in the inflection time of Korea plastic surgery. In Figure 4, drama is taken off before medical tourism, and then medical tourism spreads. Next, the spread of pop is happening, which is leading to the spread of medical tourism.
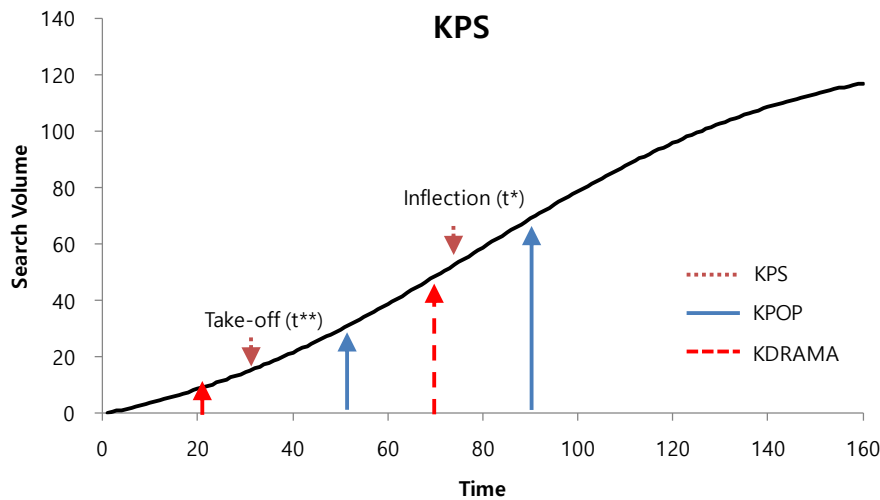
Figure 4. Take-off and Inflection Time in KPS

5. Discussion

The objective of this study was to evaluate consumers' Internet search behavior related to medical tourism and online culture content. Specifically, we explored the effects of pop culture and drama on medical tourism. From this study, we attempt to investigate the effect of Korean Wave in the view of medical tourism.

The major findings and their implications are as follows. First, an analysis of search behavior analysis revealed that online culture content influenced medical tourism. This suggests that it can revitalize medical tourism industry by spreading Korean culture contents to foreign countries. Second, the evaluation of online culture content differed according to the type of content (*i.e.*, pop culture was a more important influence on consumers' medical tourism intentions than drama). This suggests that K-Pop and K-Drama are both important for the growth of Korean medical tourism industry, but efforts to spread K-Pop are more important than others. Third, the diffusion of K-Pop immediately affected Korean medical tourism, but K-Drama was relatively later influenced for the web category. Forth, pop culture content supported the diffusion of medical tourism for a longer period of time than drama. This suggests that K-Pop should lead the diffusion of Korean medical tourism, and K-Drama should continue to support it. Fifth, in contrast to the innovation coefficient, the imitation coefficient of pop culture was higher than that for drama. This means that the diffusion pattern of pop and drama is different. In other words,

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although drama spread to a large number of people in the early stage of diffusion process through broadcasting, but pop tend to spread relatively later stage through word of mouth.

We examined the effects of online culture content on medical tourism. The findings of this study may provide a better understanding of the effect of consumers' search behavior on the global diffusion of medical tourism. To advance the knowledge obtained in this study, future studies should focus on medical tourism products and marketing.

Despite the above academic and practical implications, this study has several limitations. In defining online culture content, we did not include various types of culture content besides pop and drama. Also, we defined medical tourism only plastic surgery. Therefore, future studies need to consider various types of culture content and medical tourism.

## Acknowledgments

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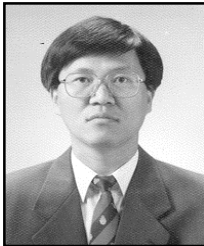
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