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What sentiment attracts tourists? Analysis of tourist attractions based on consumer's sentiment

Completed Research Paper

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Abstract

This study tried to derive meaningful insights from consumers' sentiments about tourist attractions. First, through descriptive statistics, seven sentiments representing tourist attractions were identified, and the unique sentiments about certain tourist attractions were identified. On the basis of the network analysis results, four interesting travel routes based on the sentiment theme were constructed, and four insights on the sentiment were presented. Finally, through the regression analysis, one negative word, two positive words, and three network centrality measures that significantly affect the number of visitors were identified. By applying social network analysis, more specific and differentiated conclusions have been drawn. It also provided useful implications for tourist attractions.

Keywords: Tourism, Tourist Attraction, Sentiment Analysis, Sentiment

Introduction

The country's tourism has a strong effect on expanding domestic market and creating jobs. Tourism is the key to creating the country's image and economic development. For example, Jeju Island in Pacific Asia is leading the region's economic growth through tourism(Yang, 2010). The background is low-cost air travel, improvement of tour environment, and expansion of leisure time for modern people. Tourists are attracted to numerous tourist attractions with beautiful natural scenery, various attractions, and food items. However, tourists do not know specifically "what experience they will have at tourist sites," "what information is shared online," and "how the trends in tourist destinations change." Knowledge about these factors will be essential to the continuous growth of the tourism industry in terms of maintenance. Furthermore, it will be important for the image and brand management of the country.

The activation of SNS has made it easier to find and obtain information about the tourist attractions. In fact, most consumers explore and utilize information about tourism, reservation, and leisure through the Internet. Consumers are easily influenced by other customer's sentiment, which is essential in the travel industry because consumers express and share the stories of their travel experiences about a certain tourist attraction. Meanwhile, text-mining-based sentiment analysis has been applied in various fields (e.g., movie review and brand monitoring). A few cases, however, have been applied to story-based experience where the focus is on consumer sentiment. For example, only the overall positive/negative

experience of consumers was analyzed. In other words, research on tourist's diverse sentiments is lacking. Therefore, it is necessary to analyze the data of tourist's sentiments and use them in the field of tourism.

Our research seeks to derive meaningful insights from tourism information shared on various channels. More specifically, we will analyze the travelers' sentiments about the tourist attractions in Jeju Island. On the basis of these sentiments, we will establish the image that represents Jeju Island and the unique sentiment that tourist can feel at each tourist attraction. Furthermore, we will conduct a social network analysis of these tourist attractions and sentiments. Through network analysis, the network structure and similarity between tourist attractions will be checked, and the classification of tourist attractions based on the sentiment will be carried out. Finally, using the regression analysis, we will check the impact of tourist sentiment and the network of tourist attractions on the number of visitors..

Theoretical Background

The importance of country's tourism

Tourism is key to shaping the country's image, which is the overall perception for a country and is defined as a technological, inference, and information-level belief (Martin & Eroglu, 1993). The image is formed by combining several factors, such as the political, economic, and cultural elements of the country. In particular, the cognitive, emotional, and behavioral effects of tourists directly affect the formation of images. Moreover, the image, formed either positively or negatively, has a major impact on various areas of the country's economy, culture, and politics. Therefore, developing the tourism industry improves the tourism image and tour environment, thereby increasing the satisfaction of tourists and eventually improving the country's image (Pizam et al., 1978; Cooper et al., 1993).

Tourism is a high-value-added industry along with the formation of the country's image, which has a direct impact on the economy. Korea's tourism industry, which is the focus of our research, accounts for 2.51 percent of GDP (in 2015). According to Korea Tourism Organization (2016), the "travel experience rate" and "average travel cost per person" are steadily increasing. In fact, the economic ripple effect of the tourism industry is increasing as the number of foreign tourists visiting Korea increases. To be specific, assuming the number of foreign tourists visiting Korea in 2020 is 23 million, it can estimate the economic impact to be 104 billion in production inducement, 48.4 billion in value-added inducement, and 1.53 million in job inducement (Baek, 2015). Consequently, the tourism industry has a significant effect on the expansion of the domestic market and creation of employment, and can be expected as an economic growth engine.

Consumer's tourist attraction choice and travel experience journey

The process by which consumers chose a tourist attraction can be described in the sequential steps presented by Crompton (1979) and Um (1991). First, the consumer goes through the "attention phase" that forms the awareness set. At this time, the object of attention is always their dream destination, which is typically influenced by external stimuli such as movies, dramas, and advertisements, not by the result of intentional information searching or long-term social and cultural learning. Moreover, this dream place is formed by the traces of past experience or information accumulated unintentionally. Second, the consumer considers practical constraints and goes through the "search phase" that forms the evoked set, reduced alternative, through active information searching. Finally, the consumer will go through the "action phase" of choosing one destination. In other words, the passive information searching brings some potential destinations into the tourist's attention (awareness set). However, only some of these destinations are recognized by the tourists by considering the situational constraints (evoked set). Subsequently, tourists conduct an active information search on the recognized destination and make their final choice after the search is completed (Park, 2017).

If the process of choosing the tourist attraction is an information collection, then the "travel experience journey" can be divided into the following processes: collecting travel information, experiencing the actual travel, and recalling after-travel experiences or memories. The specific characteristics of each process are as follows. First, in collecting travel information, the Internet is the most effective way

consumers collect travel information (56.0 percent), with "blogs" being the highest source of information (73.0 percent), followed by "SNS (Twitter, Facebook, etc.)" at 21.8 percent. In other words, consumers are actively using their online SNS and blogs during the journey preparation phase. Second, in experiencing the actual travel, the most significant factors were major spots and satisfaction rates, followed by "natural landscape appreciation," "famous restaurant trip," and "mountain road trip" (Jeju Tourism Organization, 2017). Finally, in recalling after-travel experiences, consumers make an assessment based on their feelings while traveling. At this point, consumers have a holistic experience of the various tourist attractions, facilities and services, the tastes of food, and accommodating employees and residents, and they will remember their feelings at that particular time. Consumers form a specific sentiment for every object they experience, which is reflected in their assessment. If the overall satisfaction is high, the willingness to visit again and recommend others will be increased. Consumers share and spread their travel experience through SNS in the form of "Prosumer."

Consumer sentiment analysis

How can we use the widespread consumer sentiment? The analysis of consumer sentiment can be used in a variety of fields and typically applied to the analysis of commercial areas and consumers' information contents (e.g., emoticons), creating practical value. According to Yoo et al. (2018), who conducted a study on commercial areas analysis based on consumer sentiment, the commercial area analysis is used for a variety of purposes and strategies such as increased sales, job creation, and risk management. Consumer sentiment on commercial areas can be an important factor that can reflect consumer's behavior. Their study was carried out to examine the attitudes, opinions, and propensity of consumers online in a quantitative manner. Furthermore, the practical implications were presented by confirming the relationship between the sales in the commercial area and the sentiments based on the obtained data. In an algorithm study (Kim & Park, 2018), a meaningful consumer sentiment was extracted through the meta-data process for "emoticons," which are unconstructed data, to establish a recommended system of custom emoticons for consumers. Specifically, introducing the structured consumer sentiment into intelligent systems has shown that businesses can strategically utilize them as intellectual resources as well as for consumer convenience and satisfaction.

As a result, new discussions will be possible by applying the sentiment analysis to tourism. Analysis methods based on consumer sentiments can create new insights, unlike the traditional methods based on quantitative figures such as consumer reviews, ratings, and consumer satisfaction. The strategic and practical analysis results can be obtained for the tourism industry, which is highly related to consumer sentiment. The data, such as consumers' insatiable writing and opinions about the tourist attraction, when properly utilized could give a strong insight into the strategies of the tourism industry.

Research Design

Research process

In this study, data collection and pretreatment were conducted, and a library of tourist sentiment words was established. Although the collected data on consumer sentiments alone could derive various insights, we tried to perform a more diverse analysis. Thus, the network analysis of collected sentiment was carried out to construct the tourist sentiment network, and the comprehensive and quantitative results were obtained. Although it is important for each tourist attraction to have certain sensitivity, besides, the positioning information occupied by the sensibility corresponding to the tourist spot in the consumer's mind may be more important. In other words, through the network analysis, it is possible to confirm how individual attractions are connected based on consumer sensitivity, and furthermore, network analysis can be provided as a quantitative index. As a result, in order to reflect this relationship information in tourist attraction visitor forecasting, the index derived from the network analysis result was reflected in the tourists' explanation model. As a result, in order to reflect this relationship information in tourist attraction visitor forecasting, the index derived from the network analysis result was reflected in the visitor number explanatory model. The overall process of the study is shown in Figure 1.

Figure 1. Overall Research Process

Data collection for tourist attraction

The data were collected through the official Jeju information portal by the Korean government. Jeju Island's top 100 tourist attractions were selected; this rank is based on consumer ratings. For further analysis, basic data were collected such as the location of tourist attractions, the number of photos shared, number of reviews, and number of recommendations.

Table 1. Tourist Attraction data

No.	Tourist attraction	Photos shared	Reviews	Recommendation
1	Udo Island	1,210	479	23
2	Seongsan Ilchulbong	933	457	36
3	Camellia Hill	1,011	387	22
4	Hyeopjae Beach	742	366	25
5	Woljeongri Beach	721	357	17
…				
96	Gunsan Oreum	52	24	1
97	Hello Kitty Island	53	24	1
98	Hado Beach	44	24	1
99	World Automobile Jeju Museum	40	24	0
100	Seonunjeongsa	45	24	1

Data collection for consumer sentiment

We collected the consumer sentiment for tourist attractions. Specifically, the data on sentiment and issue words mentioned for 3 months (January 1, 2018, to April 1, 2018) on Jeju Island's tourist attractions were collected, focusing on Twitter and blog. Sentiment words consist of the total amount of consumer's sentiment, positive, neutral, and negative words for each tourist attraction. In addition, issue words consist of the total amount of issue words, blog, and Twitter references related to each tourist site. However, we found that some tourist attractions were rarely mentioned in online. Thus, only 89 tourist attractions were included in the next analysis, which fit the minimum amount of reference in online.

Table 2. Data on Tourist Attraction sentiments

No.	Tourist attraction	Sentiment words	Positive words	Neutral words	Negative words	Issue words	Blog ref.	Twitter ref.
1	Udo Island	32,543	23,016	2,112	7,415	41,442	20,850	20,592

2	Jeju International Airport	19,154	16,555	795	1,804	24,411	5,965	18,446
3	Seongsan Ilchulbong	18,058	14,844	1,161	2,053	19,048	745	18,303
4	Seopjikoji	10,494	7,978	8,801	1,636	11,186	230	10,956
5	Sanbang MT.	9,920	8,560	479	881	10,574	482	10,092
…								
85	Camellia Hill	73	69	1	3	155	82	73
86	Fairy and Woodsman Theme Park	59	54	2	3	59	0	59
87	Wodongbong	28	27	0	1	28	0	28
88	Noksan Yuchae Flower Road	22	20	2	0	22	0	22
89	Ihoteu Horse Lighthouse	9	8	1	0	9	0	9

Pretreatment of sentiment words

A total of 167 words were identified in the previously collected sentiment words. Each word consists of "expectations for travel," "feelings from traveling," "describing a tourist destination," and "the overall feeling." However, similar feelings are expressed in various words because of their linguistic characteristics. Therefore, integration was conducted on the basis of the meaning of the entire words. Specifically, words of similar meaning were integrated into one word with typical meanings. However, words that were determined to be the characteristic of tourist attraction were retained. As a result, the 167 words were reduced to 50 words. In this study, based on the emotional advance study related to travel, we built the emotional dictionary by combining travel experience journeys proposed in this study (Vania et al., 2014). In addition, we refer to emotional words related to online news and reviews (Ana et al., 2017; Rao et al., 2014), and modify the emotional words according to the purpose of this study.

In the integrated words, 37 positive words were identified. In addition, 13 negative words were identified for each tourist attraction. Negative words reflect the experience aspect of the consumers while touring and the monetary aspect related to traveling expenses. Finally, the words that express consumer sentiments about a tourist attraction is presented in Table 3.

Table 3. Consumer's Sentiment Words

Positive sentiments			Negative sentiments
Tasty	Fresh	Plentiful	Tired
Stylish	Warmth	Luxury	Short
Happy	Kind	Useful	Expensive
Best	Healing	Active	Uncomfortable
Recommend	Famous	Fragrant	Dislike
Cozy	Fruitful	Fantastic	Dangerous
Excellent	Proud	Worthwhile	Weird
Expect	Touching	Light	Regret

Satisfactory	Safe	Drowsy	Fussy
Comfortable	Perfect	Pure	Ordinary
Frugal	Great	Bright	Tasteless
Pleasant	Unique	—	Embarrassing
Amazing	Striking		Dirty

However, the number of integrated words, which is 50, is still too high to be included in regression analysis. Therefore, a dimension reduction was performed through factor analysis. The negative words were reduced to three factors and positive words to seven factors. Subsequently, 10 reduced word factors were included in the regression.

Table 4. Factor Analysis Results

Word factor		Sentiment word
Negative sentiment	Negative Sentiment 1	Tired, Short, Expensive, Uncomfortable
	N.S. 2	Dangerous, Regret
	N.S. 3	Dislike, Fussy
Positive sentiment	Positive Sentiment 1	Cozy, Pleasant, Fresh, Comfortable, Warmth
	P.S. 2	Useful, Fruitful, Kind
	P.S. 3	Striking, Perfect, Healing
	P.S. 4	Unique, Touching
	P.S. 5	Fragrant, Luxury
	P.S. 6	Active, Safe
	P.S. 7	Fantastic

Research Results

Common and unique sentiments about the tourist attraction

The result of the descriptive statistics showed that a total of 24 common sentiment words appear for more than 50 tourist attractions. These 24 words can be interpreted as universal sentiments that consumers feel in Jeju Island. Seven words are common in all tourist attractions, which can signify the consumer sentiment in every tourist attraction. In other words, it can be interpreted as a brand image that represents Jeju Island.

Table 5. Common Sentiment

No.	Sentiment Words	Seongsan Ilchulbong	Camellia Hill	Marado Island	Bijarim	Saryeoni Forest Road	Hyeopjae Beach	Chagwido Island
1	Stylish*	11,089	4,977	3,283	3,206	2,425	3,352	1,690
2	Excellent*	10,519	4,269	3,866	3,241	2,062	3,088	1,630
3	Happy*	7,191	2,495	3,007	2,210	1,341	2,234	1,542
4	Tasty*	7,386	2,807	1,359	1,694	1,059	2,539	194
5	Recommend*	3,389	11,247	1,720	723	473	779	1,250
6	Satisfactory	2,813	1,211	592	524	733	930	115

7	Cozy*	2,721	1,249	426	838	447	934	79
8	Pleasant	2,795	494	586	817	394	1,227	85
9	Comfortable	2,013	881	623	855	436	712	116
10	Best*	1,924	761	635	669	401	561	82
…								

*Sentiments that appeared in all tourist attractions

Meanwhile, unique words have been identified for some tourist attractions. The unique sentiment seems to be caused by the uniqueness of the tourist attraction that consumers can only experience.

Table 6. Unique Sentiment

Sentiment word	Tourist attraction
Bright	Hueree Park
Pure	Jeolmul Forest Park
Dirty	Ihoteu Horse Lighthouse
Embarrassing	Jeju Love Land
Light	Noksan Yuchae Flower Road

Social network analysis on tourist attraction

To identify more specific results, a social network analysis was performed. This analysis can define data-to-data relationships as a network and derive various indicators, including the characteristics of the network, thus taking advantage of eliciting information from a different perspective with traditional statistical techniques (Jun & Park, 2013; 2017).

A two-mode network consisting of rows and columns with tourist attractions and sentiment words for Jeju Island was established to confirm the relationship between attractions and words. Furthermore, the two-mode network was converted into a one-mode network, and the centrality indices were calculated.

Two-mode network of tourist attraction and sentiment word

A two-mode network represents a concentric structure centering on 24 common words, which made the network structure centralized and complex. Thus, the complexity of the network was adjusted by excluding the 24 common words. As a result, the relationship between each tourist attraction and sentiment word can be more clearly identified. The words "Unique," "Fantastic," "Plentiful," and "Fragrant" that are located at the center are connected to many attractions and appeared frequently. By contrast, words such as "Bright," "Pure," and "Embarrassing" are identified as independent words that are each linked to one tourist attraction.
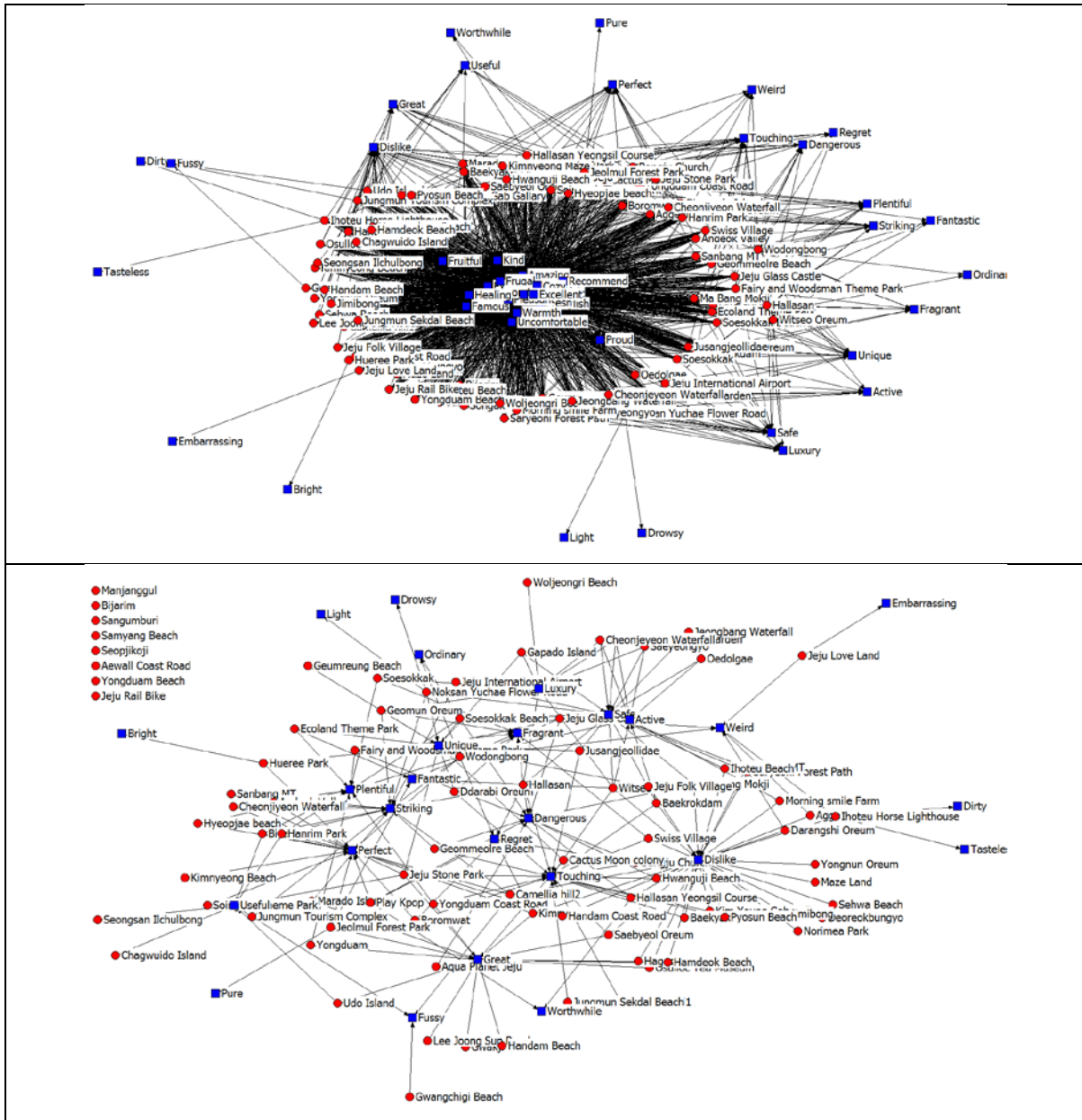
Figure 2. Two-mode network of Tourist Attraction and Sentiment word

One-mode network of tourist attraction

For further analysis, the structure was verified by converting the two-mode network to a one-mode network. The one-mode network was visualized by tourist attractions according to the K-Core, except for the 24 common words. The network consisted of 11 attraction groups, each was divided into different colors. At this point, the red attraction group in the center of the network and the green attraction group have similar sentiments. Meanwhile, in the case of Gwangchigi Beach, Woljeongri Beach, Jeju love Land, Chagwido Island, and Seongsan Ilchulbong, a distinct sentiment exists compared with other attractions. Thus, different groups formed outside the network.
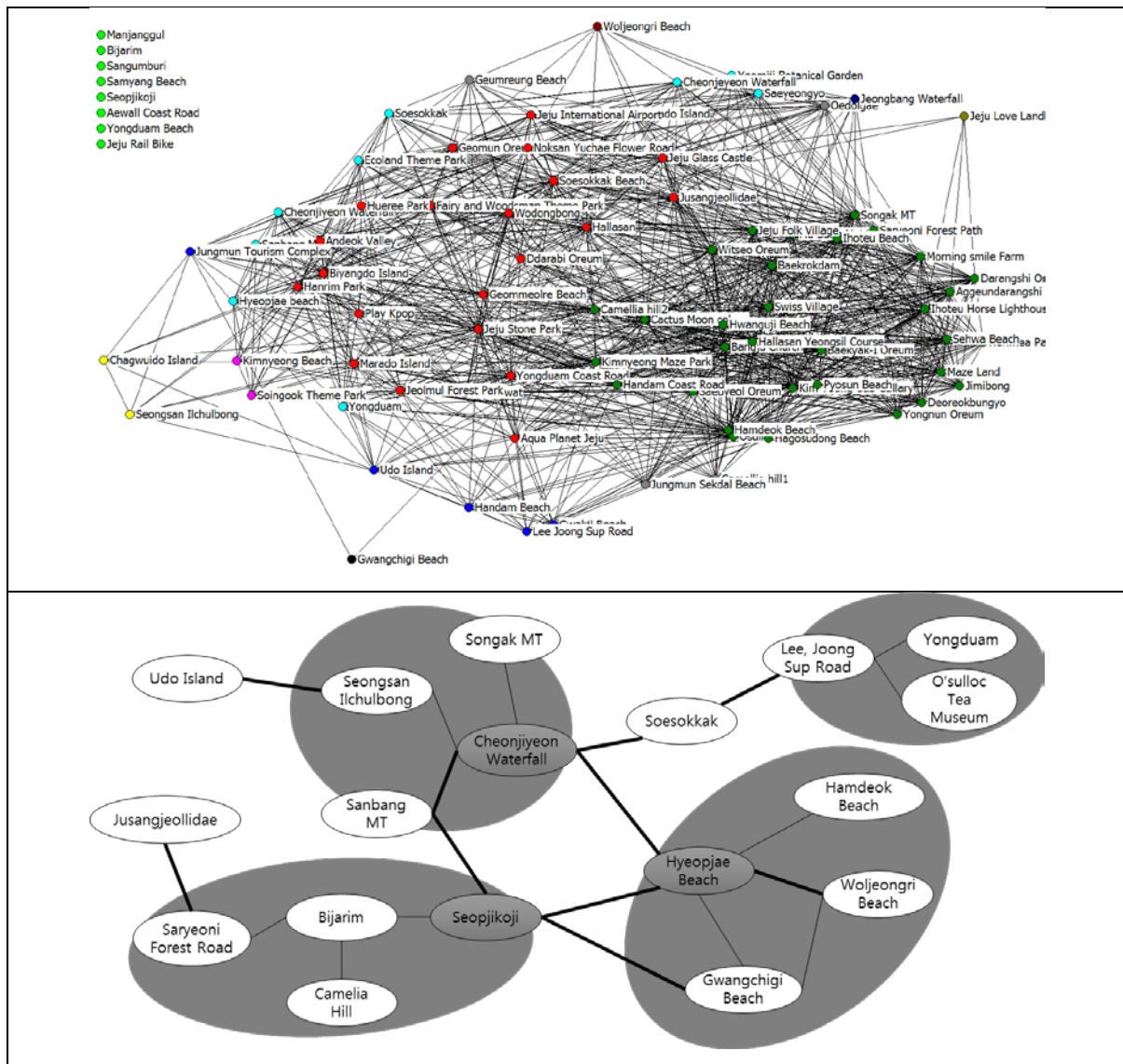
Figure 3. One-mode network of Tourist Attraction

Four major groups can be identified in a tourist network linked with similar sentiments. Furthermore, the theme can be set on the basis of each relationship, and an interesting travel route can be established.

First, visitors can feel "Great," "Striking," and "Touching" emotions in the attraction groups, namely Sanbang MT, Songak MT, and Sungsan Ilchulbong, centering on the Cheonjiyeon Waterfall. Therefore, a "Grand" emotional travel route can be organized around the tourist attraction.

Second, visitors can feel "Cozy," "Healing," and "Comfortable" emotions in Seopjikoji, Bijarim, Camellia Hill, and Saryeoni Forest Road. Therefore, the "Healing" and "Walking" travel route can be organized.

Third, visitors can feel "Active" and "Happy" emotions in attraction groups, namely Hyeopjae Beach, Gwangchigi Beach, Woljeongri Beach, and Hamdeok Beach. Hence, "Active, Beach" travel route can be organized.

Fourth, visitors can feel independent and unique emotions in attraction groups Lee Joong-sup Road, Yongduam, and O'sulloc Tea Museum. Therefore, consumers can feel the unique emotions in these destinations.

One-mode network of sentiment words

A sentiment-based one-mode network that consists of rows and columns with words was established. The process is the same as the attraction network. The network consists of eight groups. At this point, words located in the center of the network frequently appear in various tourist attractions. In addition, the words "Bright," "Pure," "Tasteless," and "Dirty" located outside the model are identified by unique sentiments. What is noteworthy is that the sentiment word "Embarrassing" has only one connection in the Jeju Love Land and is the most unique sentiment for the entire tourist attractions.

As with the attraction groups, four major relationships are identified for the sentiments. First, a negative sentimental relationship exists between "Dislike," "Tasteless," and "Dirty."

Second, "Dangerous," which is a negative sentiment that is directly connected with "Dislike," has a connection with "Safe." In other words, a reversed sentimental relationship exists between "Dangerous" and "Safe"; "Dangerous" switches to "Touching" and "Fantastic" when "Safe" is ensured.

Third, the "Weird" sentiment has connections with "Dislike," "Embarrassing," and "Unique" sentiments. This implies that even if consumers feel "Weird," they can be perceived differently depending on the external environment of the tourist attraction and the consumers' internal experience.

Fourth, the "Unique" sentiment has connections with the positive sentiment felt at Jeju Island's tourist attractions. A relationship with the sentiment "Perfect" is identified, which is connected to the "Fragrant," "Plentiful," and "Bright" sentiments.
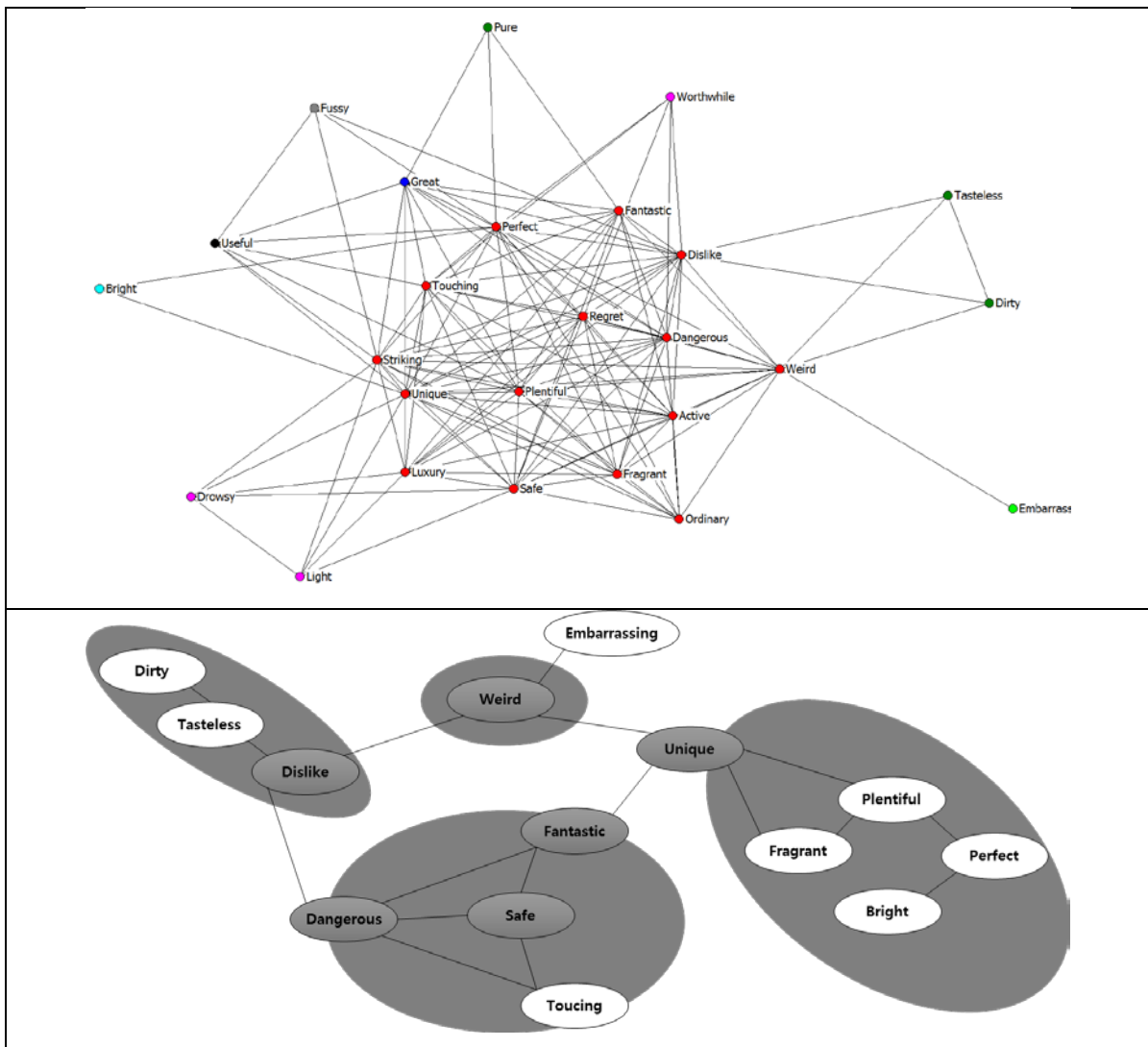
Figure 4. One-mode network of Sentiment Word

The network index was then calculated on the basis of the network. At this point, among the various indices of network analysis, the focus was on network centrality.

Regression analysis of the number of visitors to the tourist attraction based on sentiment

Finally, we identified the impact of sentiment and the network on the number of visitors to the tourist attraction. The variables that affect the number of visitors are typically sentiment word data, network centrality, and regional information, which are the control variables.

Through multiple regression analysis, the influence and direction of many variables on the number of visitors were verified. The final model was constructed using the backward method of the regression model estimation, the first model with all the variables was constructed, and the factors were eliminated on the basis of the contribution to the *F* value.

Table 7. Results of the Regression Analysis

Variable	Unstandardized beta	Standardized beta	t	Sig.
(Constant)	14.676	–	10.863	0.000
N.S. 1	−0.007	−4.473	−2.223	0.046
N.S. 3	0.073	0.536	2.090	0.059
P.S. 1	2.403	4.013	2.452	0.030
P.S. 2	1.195	1.798	2.297	0.040
P.S. 4	0.198	0.387	1.371	0.196
P.S. 5	−0.540	−0.748	−1.601	0.135
P.S. 6	0.268	0.219	0.569	0.580
P.S. 7	2.409	0.522	1.103	0.292
Degree centrality	26.116	1.864	1.888	0.083
Closeness centrality	−3.277	−0.810	−2.133	0.054
Betweenness centrality	−74.601	−1.035	−1.887	0.084
Number of stores	−3.887E−05	−0.385	−1.093	0.296
Number of households per store	0.204	0.213	0.784	0.448
Number of facilities per store	−4.569	−0.515	−1.482	0.164
$F_{(12,25)} = 2.202$, $p < 0.089$, Adjusted $R^2 = 0.393$				

The analysis results showed that the variable elimination of the eight steps was performed, and the following six significant independent variables were identified: "Negative Sentiment 1(N.S. 1)," "Positive Sentiment 1(P.S. 1)," "P.S. 2," "degree centrality," "closeness centrality," and "betweenness centrality." The significant independent variables are divided into sentiment words and network centrality. The variables included in the sentiment word were significant at significance level 0.05, and the variables included in the network centrality were significant at significance level 0.1. Centrality is not a quantitative value collected through statistics. The network analysis quantifies the qualitative values of the relationship between tourist attractions and sentiments. Thus, the significant level was mitigated to 0.1 in the verification. The model's R^2 value was 0.393.

The analysis results reveal something remarkable. Among the independent variables, the standardized beta's absolute values of "N.S. 1" and "P.S. 1" were the highest. In other words, the sentiment of

consumers about the tourist attraction has a very high impact on the number of visitors. Among the types of sentiments, in particular, those corresponding to "N.S. 1" and "P.S. 1" have a direct influence on attracting visitors to the tourist attraction.

Specifically, "N.S. 1" has a higher standardized beta value than "P.S. 1." The direction of influence is also reversed. In other words, even if consumers feel happy and positive emotions at the attraction, the number of visitors may decrease because of a few negative emotions. "N.S. 1" includes "Tired," "Short," "Expensive," and "Uncomfortable" sentiments. Consequently, the number of visitors to the tourist attraction is greatly reduced if some consumers have the "N.S 1" sentiments at the tourist attractions.

By contrast, "P.S. 1" and "P.S. 2" have a positive effect on visitors. In this case, "P.S. 1" consists of "Cozy," "Pleasant," "Fresh," "Comfortable," and "Warmth" sentiment words. Moreover, "P.S. 2" consists of "Useful," "Fruitful," and "Kind." Apparently, positive sentiment contrasts with negative sentiment. Therefore, the number of visitors increases when consumers feel these positive emotions at the tourist attractions.

Meanwhile, three of the four centralities calculated through social network analysis also have a significant effect. Degree centrality has a positive effect on the number of visitors, whereas closeness centrality and betweenness centrality have a negative effect on the number of visitors.

Specifically, the increasing degree centrality in tourist attractions can attract more visitors. The tourist sentiments network that calculates the centrality does not have the direction between the connections. Thus, the calculated degree centrality denotes the number of consumer sentiments at a tourist attraction. As a result, degree centrality can be interpreted as follows: When consumers can feel a variety of emotions more at a tourist attraction, more visitors can be attracted to that particular tourist attraction.

Meanwhile, closeness and betweenness centrality can attract more visitors as the centrality decreases. Tourist attractions with low closeness centrality in the network are distant from other attractions. In addition, tourist attractions with low betweenness centrality do not arbitrate with other tourist attractions. Thus, according to the definition and structure of centrality, tourist attractions with low closeness and betweenness centrality are located at the edge of the network. As a result, tourist attractions with low closeness and betweenness centrality are interpreted to receive relatively unique sentiment from consumers. In sum, when consumers have more unique sentiment for that particular tourist attraction, which is difficult to experience in others, then that tourist attraction can attract more visitors.

Conclusion

In this study, we tried to obtain meaningful insights based on consumers' sentiments about tourist attractions. By applying the social network analysis, more specific and differentiated conclusions have been drawn. This study also provides useful implications for tourist attractions. Specifically, we identified how consumers felt at each tourist attractions. It also identified images and unique sentiment that represent certain tourist areas (Jeju Island). Afterward, the network analysis was performed to examine the network structure, and an interesting theme and travel route based on the sentiment were proposed. Finally, through the regression analysis, the influence of sentiment and network structure on the number of visitors to the tourist attraction was confirmed.

The analysis results are summarized as follows. First, through descriptive statistics, seven sentiments representing tourist attractions were identified, and the unique sentiments about certain tourist attractions were identified. Results of the network analysis revealed that four interesting travel routes based on the sentiment theme were constructed, and four insights into the sentiment were presented. Finally, through regression analysis, one negative word, two positive words, and three network centralities that significantly affect the number of visitors were identified.

The results of our study have practical implications. First, the process of our research is a new attempt to apply consumer sentiment to the tourism industry because, although consumer sentiment has already been actively utilized in other areas, there is a lack of research applied to consumer sentiment in tourism. Second, our study has differentiation that quantifies the relational characteristics of sentiments and the influence through the network analysis of sentiment. Prior study of consumer sentiment only identifies the types of sentiments and the influence of each sentiment. Third, the methodology presented in our

study can collect and analyze data at a lower cost. It is also easy and intuitive to visualize the analysis results. The methods can be used continuously through regular updates; hence, this study has superiority in terms of economy, practicality, and sustainability. Therefore, the results of this study could be used to develop strategies for upgrading and differentiating the tourism industry.

However, our study has several limitations. First, it is practically impossible to measure the target number of visitors to all tourist attractions. Therefore, only attractions whose number of visitors was confirmed were analyzed because of practical restrictions. Second, there is a possibility for subjective interpretation of sentiment. In our study, the sentimental framework used in the preceding study was used to minimize the problems. In addition, the work of integrating and classifying sentiments with experts has been carried out. However, subjectivity is still likely to be involved. Third, data from SNS were collected and used for analysis to verify consumer sentiment. In fact, however, there are only a limited number of people who use SNS, and the sentimental level of each age group will vary. Therefore, care needs to be taken to distinguish sentiment by age. Finally, the data collection period is January–March, which is Jeju Island's off-season. The data were collected at the same time last year to ensure maximum consumer sentiments at present. However, tourism and travel are closely related to the seasonal cycle, so research over time is needed.

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