

Spatial movement patterns among intra-destinations using social network analysis

Abstract: To explore popularly visited tourist locations, travel movement patterns, and movement points, this study collected samples of 321 Chinese tourists and 337 Japanese tourists who were visiting major tourist destinations in Seoul and its vicinity in South Korea. Results of analyzing movement patterns showed that Japanese tourists tend to be clustered around popular attractions, whereas Chinese tourists tend to spread over a larger area of attractions. Some specific shopping and amusement attractions were the locations most popularly visited by both groups. The start points and end points in the two groups' itineraries were dissimilar overall, even though their patterns were similar in regard to major preferred tourist attractions. Thus, the findings of this study have the potential to contribute to understanding spatial mobility in a tourism destination through tracking tourists' movement patterns.

Keywords: attractions; social network analysis; movement; centrality; intra-destination mobility

Introduction

An integral part of tourism travel is the ability to move to and within destination. On one hand, inter-destination movement behaviors are reflections of bilateral or multi-lateral international relationships (Balli et al., 2016; Dai et al., 2017; Gokovali et al., 2007; Kim et al., 2009; Kim et al., 2016; Kim & Morrison, 2005; Kim et al., 2016; Prideaux & Kim, 1999; Timothy & Kim, 2015). At the local level, however, the ability to move within a destination is an indispensable reflection of the destination's design and planning, diversity of attraction and activities, and the spread of tourism resources (Lau & McKercher, 2006). Intra-destination trips allow tourists to visit multiple sites within one location (Kang, 2016; Lau & McKercher, 2006). However, spatial movement in the context of intra-destination mobility has stimulated an interest to only few researchers (e.g., Lew & McKercher, 2006; Mckercher & Lau, 2008).

In basic terms, spatial movement implies an intersection or interrelation between multiple elements or objects. Social network analysis is applicable to the investigation of tourists' spatial movement patterns within a specific city or region. It is particularly valuable

for joint marketing and tourism course development. Specifically, meaningful data regarding tourism in cities and regions, gained from analyzing the behavioral characteristics of individual tourists, would be valuable for the development of new tourism courses and marketing efforts among different regions and tourist destinations.

Meanwhile, a few previous studies related to multi-destination trip behavior have attempted to map inter- or intra-destination movement paths and patterns using various geo-analytic techniques, such as GIS and GPS, and data mining (McKercher & Lau, 2008; McKercher et al., 2012; Xia et al., 2010; Zheng et al., 2017). The overall structure and nature of a destination are, however, not easily understood due to different tourists' preferences for different attractions and their different movement tracks.

Accordingly, this study aims to identify the destinations most visited by tourists in Seoul and its vicinity and the tourists' movement points on their travel itinerary. The study identified the travel patterns of mainland Chinese (henceforth, Chinese) and Japanese tourists to Korea. More specifically, this study has four objectives: first, to identify the most visited locations using in-degree centrality analysis; second, to examine movement flow using out-degree centrality analysis; third, to explore the movement points of each tourism location, such as start points and end points; and fourth, to compare the results between Chinese and Japanese tourists. Therefore, the results of this study are expected to contribute to promoting tourist destinations effectively and to developing tourist-specific tourism package products in partnership with municipal governments through understanding the connections between tourist attractions. Because local-level destinations (such as cities) have their core attractiveness, it is possible to identify the spatial network of attractions within a destination (Papatheodorou, 2004).

Literature review

Destination attractiveness and attractions

A tourist destination is a product composed of tourism resources, tourism services, public services, sociocultural activities, and other services. Typically, a tourist destination is regarded as a single unit largely comprised of a specific geo-political boundary (Henderson, 2017; Murphy et al., 2000; Sanz-Ibáñez & Anton Clavé, 2014). However, tourists visit many interdependent destinations during their tourism experience rather than just one place exclusively. This pattern is particularly obvious in the case of international tourism (Henderson, 2017; Lue et al., 1996; Shih, 2006). Thus, a destination is an amalgam of interdependent units within a single travel experience rather than an isolated unit (Pearce, 2015). Altogether, the attractiveness of a tourist destination is relative to the importance of individual benefits and the perceived ability of the destination to deliver those individual benefits (Mayo & Jarvis, 1981).

Destination attractiveness is informed by both micro- and macro-level factors. At the micro level, cognitive and emotional desires inform destination attractiveness (Hu & Ritchie, 1993; Lue et al., 1996; McKercher et al., 2006). Factors influencing the selection of tourist destinations at this level can be broadly categorized as pull and push factors (Beerli et al., 2007; Dann, 1981; Wong et al., 2017). Pull and push factors useful for identifying the motivations underlying tourists' decisions and visiting behavior. Push factors influence decision-making concerning individuals who want to escape from daily life, whereas pull factors influence decisions about which specific destinations they select (Dann, 1981; Kim et al., 2003; Klenosky, 2002; Otoo & Amuquandoh, 2014). Pull factors are related to the attractiveness, attributes, and characteristics of the destination itself, including beaches, water and coastal resources, mountains, beautiful landscapes, historical and cultural resources, and even accommodation choices. Push factors reflect the desire to travel resulting from tension, the need to escape from

daily life, social exchange, and prestige (Kim et al., 2012; Uysal & Hagan, 1993; Wong et al., 2017).

At the macro level, destination attractiveness is informed by reference to national- or macro-level stereotypes (Crotts & Erdmann, 2000; Dai et al., 2017; Elliot et al., 2011; Lee et al., 2011; Oh et al., 2013). At this level, a destination's attractiveness to the masses is linked to historical associations (Mowatt & Chancellor, 2011), cultural similarity (Kim et al., 2015; Kim et al., 2010; Murphy et al., 2000; Ng et al., 2007; Wan et al., 2013), or physical proximity/distance decay (Otoo & Kim, 2018; Szytniewski et al., 2017; Zhang & Qu, 1996). Meanwhile, the appeal of a destination is primarily rooted in the convergence of tourists needs and the availability elsewhere of satisfiers for those needs. While decades of tourism literature have failed to reach a consensus regarding which elements are vital to destination attractiveness, it is agreed that there are no destinations without an attraction.

Therefore, tourist attractions are the bedrock of tourism development and reflect, at both the micro and the macro level, the attractiveness of destinations. They are the "non-home" elements that pull discretionary travelers towards destinations and include the physical make-up, activities, and experiential aspects of destinations (Kim et al., 2011a; Kim et al., 2008; Leiper, 1990; Lew, 1987; Richards, 2002). Although traditional categories of tourist attractions are formulated on three levels, namely, ideographic (or formal), organizational (or geographical), and cognitive (perceptive), the notion of physical space is commonly applied in the tourism literature (Leiper, 1990; Lew, 1987; Liu et al., 2017; McKercher et al., 2006; Pearce, 1991). This means destination attractions (including physical, cultural, and historical attractions and events) exist in a given space. In this regard, tourist attractions are the "spatial existences" of tangible and intangible manifestations of a country's heritage, including

historical objects, culture, or natural features, and the geographical demarcations within which these exist.

Spatial movement patterns

The reasons for the multiple intra-destination patterns are as follows. First, international tourists participate in various activities during a given travel opportunity. Second, tourists can reduce the possibility of having an unsatisfying travel experience by visiting many tourist destinations. Third, many decision makers are typically involved in planning and executing a travel experience. Fourth, visiting many tourist destinations can be beneficial in terms of time and expense. Thus, for many tourists, visiting multiple intra-destinations can be a more meaningful alternative to visiting a single tourist destination.

Tourists' inter- and intra-destination movements are also important in destination marketing and tourism policy development applications and useful in detecting future travel behavior (Xia et al., 2010; Lau & McKercher, 2006; Zheng et al., 2017). While studies have focused on inter-destination movements, it is becoming increasingly evident that intra-destination movements are valuable for transport policy development (Masiero & Zoltan, 2013) and service location considerations (Shoval et al., 2011).

Building from previous studies (Lue et al., 1993; Mings & McHugh, 1992; Oppermann, 1995), McKercher and Lew (2004) classified tourists' intra-destination movements into four thematic patterns: single leg, transit leg, hub-and-spoke, and circle tour. However, later observation by McKercher and Lau (2008) revealed that movement patterns are far more dynamic; they found 11 different movement styles using hotel residency as the reference point of movement to attractions. An important conclusion from these studies is that movement patterns are affected by personal and inherent factors, including risk avoidance, which are not

only personal but also informed by some national stereotype (Kim & McKercher, 2011; Litvin et al., 2004; Reisinger & Crofts, 2010). However, a shortcoming of the GPS approach is that the dynamism within tourists' movements is only partially manifested. The spatial density or the clustering of tourists is not revealed as movement frequencies are not factored into the analysis.

Spatial density and inter-attraction movement

The concept of spatial density and clustering has been applied in analyzing the geo-spatial density of photos using geo-spatial coordinates (Vu et al., 2015; Zheng et al., 2012). The concept explains the relative importance of attractions on the basis of the frequency (cluster) of utilization by tourists. Spatial density is also useful in relating the characteristics of tourists to the attributes of a given destination. As with past studies, the aim of this study is to provide a visual depiction of the frequency of use of attractions and attraction routes by tourists. A path showing more connecting and passing lines depicts a higher density of movement (Vu et al., 2015). While the technical details are not explored within this study, its interpretations are useful to understanding the movement and volume of tourists and how attractions are networked within intra-destination travel.

Spatial movement analyses in the tourism industry have been conducted in previous studies (Hong et al., 2015; Lee, 2014; Li et al., 2015), a few of which are discussed in this review. Lee (2014) examined the types of duty-free purchases of domestic customers in duty-free shops in Korea through spatial movement analysis. In his study, results of route analysis that fashion goods, perfumes, cosmetics, watches, and jewelry are placed close to each other and souvenirs, mainstream products, and electronic products are in close proximity. Second,

an analysis of the centrality degree showed that cosmetics are the most central products, followed by fashion goods, perfumes, watches, jewelry, liquor, electronics, and tobacco.

Hong et al. (2015) presented a spatial movement model of tourist attractions using tour packages and focused on the relationship between tourist networks and tourism flows. With the assumption that greater tourism flows will correspond with higher links within China, the authors applied a two-stage game model. First, the authors found that greater linkage in networks could be strategic in increasing destination competitiveness. The authors also proposed that a positive association exists between the types of centrality of a destination and its tourism flows. Overall, competitiveness was the principal proposition of their study. One caveat of their study is the absence of a multi-origin comparison which would have offered a distinctive answer to the question ‘Who is more likely to travel where?’, a salutary outcome for tour packaging.

Shih (2006) examined tourists visiting 16 tourist destinations in Taiwan using spatial movement analysis. Applying it to the structural configuration of each of these destinations, the author tested the association between centrality types (degree, closeness, and betweenness) within each of the 16 tourism destinations. The study revealed that differences among nodes are traceable to barriers and opportunities, which are in turn attributed to how these nodes are connected within a destination. In addition to this, Shih postulated that the structure and characteristics of links within networks are dependent upon local interactions between nodes. Shih therefore called for appropriate tourism facilities and services to be offered at individual destinations on the basis of the structural characteristics related to the network position of various tourist routes. The processes of constructing a pattern for tourists’ intra-destination movement for different national groups are not, however, evident from these studies. The more

pressing recommendation, therefore, is for the application of social network analysis within the context of intra-destination movement behavior.

The application of spatial movement analysis in tourism has valuable merits. First, spatial movement analysis helps to identify as many major nodes in a network as possible (Liu et al., 2017; Wasserman & Faust, 1994). Second, spatial movement analysis using patterns that arise when looking at tourist destinations has the advantage of analyzing tourist patterns within a certain city or region (Casanueva et al., 2016; Liu et al., 2017). Third, spatial movement analysis can provide valuable insights into developing joint marketing strategies for tourist destinations and tourism packages.

In addition, spatial movement analysis using big data can be extended to include a line-by-line analysis in terms of analyzing the movement patterns of tourists between tourist destinations. In situations in which FITs (foreign independent tourists) account for 70 to 80 percent of the total number of inbound tourists, spatial movement analysis can help redesign tour packages and provide data for linking marketing campaigns centered on tourist sites (Lau & McKercher, 2006; Pearce et al., 2009).

Social network technique as a tool for spatial movement analysis

A specific tool for such big data analysis is social network analysis. Usually, this involves investigating the structure of social network sites and the formation of networks (Casanueva et al., 2016; Kim & Tussyadiah, 2013). A major benefit of employing social network analysis is that it offers various methodologies and indicators to measure node connections and to show a structured pattern of linked systems. This form of spatial movement analysis is possible using the UCINET statistical package. Here, tourist destinations are expressed as nodes or actors and the movement of tourists is regarded as a series of links. By examining the connectivity among

actors in a network, we are able to comprehend which actors are most important and influential and the pattern of connectivity among actors.

Due to their size and various characteristics, big data cannot be processed by existing information management technology. With the development of smart devices and network technology, the amount of big data is increasing exponentially. Social network analysis has been applied to graph theory, which is a useful analytical methodology for identifying the structure of relationships among given objects (Wasserman & Faust, 1994). Spatial movement analysis therefore focuses on the relationships among objects or actors and can be referred to as the collection of dots and lines (Kim, 2003; Liu et al., 2017).

Regarding the centrality (powers of influence) of objects or nodes, Freeman (1979, 1980) identified three types of centrality: degree centrality, closeness centrality, and betweenness centrality (exhibited in Figure 1). First, closeness centrality which refers to the center of the shortest path of this relationship is a method of determining centrality by measuring the distance of indirectly connected points in a network (Wasserman & Faust, 1994). The higher the proximity of the center node and the closer to the center of the network it is, the more influential it is with other nodes. Betweenness centrality is established when there are two or more individuals and/or groups that are different from each other (Wasserman & Faust, 1994). Centrally located nodes are located at the shortest distance from the other nodes. In other words, tourist attractions with a high mediation center can be very important intermediaries among other tourist attractions since most tourists will be able to experience tourist attractions with high mediation while visiting other tourist attractions.

Degree centrality, on the other hand, measures centrality on the basis of the number of links connected to each node (Kim & Tussyadiah, 2013). The degree centrality measurement features both absolute centrality and relative centrality, but generally, the relative centrality of

comparable measurements in networks with different numbers of members is preferred (Wasserman & Faust, 1994). In general, degree centrality is greater, with more connections. Degree centrality can be classified into in-degree and out-degree centralities using the nodes in a directional network (Opsahl et al., 2010). In-degree centrality indicates the measure of how many ties a node receives, while out-degree centrality refers to the measure of ties sent from any node (Borgatti et al., 2002). Degree centrality is preferable to the other types of centrality analyses given its application where only the local structures around a node are utilized so that the global structure of the network is not accounted (Opsahl et al., 2010). Its application is also justified because the speed of a node reaching others quickly is not an objective of this study. Degree centrality is depicted by the following formula (Opsahl et al., 2010; Wasserman & Faust, 1994)

$$C_D(i) = \sum_j^n x_{ij}$$

Where:

$C_D(i)$ = degree centrality of node i

i = the focal node

j = all other nodes

n = the total number of nodes

x = the adjacency matrix

The three types of centrality are illustrated graphically in Figure 1.

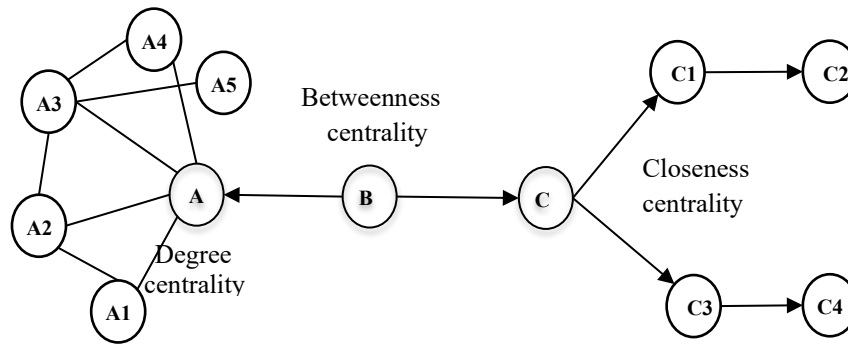


Figure 1. Three types of centrality in SNA

Consider a simple network featuring four tourism destinations, A, B, C, and D, and the volume of tourists visiting these places. If ten tourists move from A to B, six tourists move from C to B, three tourists move from C to D, and one tourist moves from C to A, the movement pattern of the tourists can be presented as shown in Figure 2. The thickness of the arrow shows the volume of the tourists' movement (density). In this figure, node B is an in-degree of tourists from nodes A and C, with node A as the most important node to B, whereas node C is an out-degree to nodes D, A, and B. The most important node generally takes a strategic location in the connection (Casanueva et al., 2016; Shih, 2006).

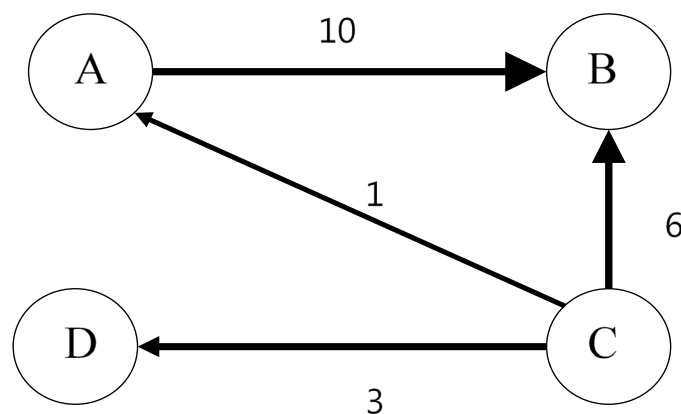


Figure 2. Spatial movement density and in-out-degree centralities

Methods

International tourism flow of Chinese and Japanese tourists to Korea

According to the Seoul Tourism Product Survey (Chosun Ilbo, 2014), 93.8% of Chinese tourists to Korea included Gyeongbok Palace in their tourism experiences, 93.5% of them included Cheongwadae, and 43.8% of them visited Cheonggyecheon. Regarding Japanese tourists, 35.8% of the respondents visited Changdeok Palace, 29.7% toured Bukchon Hanok Village, and 28.0% visited Cheong Wa Dae, while only 16.7% included Gyeongbok Palace in their tourism activities.

The number of Chinese tourists to Korea has increased due to several reasons related to demand and supply. From the demand side, the disposable household income of this group of people has increased (Lee et al., 2011; National Bureau of Statistics of China, 2017). The diplomatic relationship between China and Korea has also stimulated mutual tourist flow. From the supply side, the influence of Korean visual media, including Korean TV drama and Korean pop music (K-Pop), has gained viewership in many Asian countries. The number of Chinese overseas travelers surpassed 100 million in 2016.

Table 1 reveals that the growth in Chinese tourists to Korea, which had reached approximately 39% in 2010, plummeted drastically to about 17.3% in 2011. In the following year, 29% growth was recorded. In 2013, Chinese tourist arrivals to Korea again peaked, reaching their highest in nearly 10 years, with an increase of 52.5%, exceeding the previous year's growth rate by 21.7%. Flexible visa application and the growth of the 'Korean wave', for example, the globally popular hit song, Gangnam Style, readily resonates with this increase (Lee & Bai, 2016; Lee et al., 2017; Lim & Giouvriss, 2017; Pan et al., 2017). While arrivals dipped slightly the following year (41.6%), the most significant decrease occurred in 2015. Within this period, the tourism industry in Korea was one of the main casualties of Chinese

economic retaliation over the deployment of the Terminal High Altitude Area Defense system (Gibson, 2017).

While Korea’s tourism authority, the Korea Tourism Organization (KTO), records that Japanese tourists in 2016 accounted for the second most important inflow of tourists in terms of arrivals (KTO, 2016), the historic arrival records of Japanese tourists to Korea reveals great volatility. In a somewhat reverse trend to arrivals from China, Japanese tourist demand for Korea grew from 1% in 2010 to 8.8% in 2011. With political relations between Korea and Japan strained and the fall in the value of the Japanese Yen, the number of Japanese tourists to Korea dropped by 21.9% in 2013 and continued to decline by approximately 17% and 17.9% in 2014 and 2015, respectively. Available statistics for 2016 depict a revitalization in Japanese tourists’ interest in visiting Korea. It is expected that recent pull phenomena, such as the Korean *Hallyu* wave, will be attractive to the Japanese market.

Table 1. Flow of tourists to Korea (unit: 1,000)

Year	Japan → Korea		China → Korea	
	Arrivals	Increase	Arrivals	Increase
2010	3,023	1.0%	1,875	39.7%
2011	3,289	8.8%	2,200	17.3%
2012	3,519	7.0%	2,837	29.0%
2013	2,748	-21.9%	4,327	52.5%
2014	2,280	-17.0%	6,126	41.6%
2015	1,873	-17.9%	5,984	-2.3%
2016	2,297	22.6%	7,532	25.9%

Study design

This study analyzes the movement patterns in tourist destinations visited by Chinese and Japanese tourists during their visits to Korea. Tourist destinations visited by Chinese and Japanese tourists were extracted from the results of a survey of foreign visitors conducted by

the KTO. A questionnaire was developed in order to conduct a pilot test using 40 foreign students at 'H' University in Korea (20 Japanese students and 20 Chinese students).

The groups targeted for this study were Chinese ($n = 321$) and Japanese ($n = 337$) tourists who visited Seoul and its surrounding areas in 2015. The survey was conducted every Saturday and Sunday at Incheon and Gimpo International Airports from March to May 2015. Given that the survey targeted foreigners, eight foreign students studying in Korea were selected as surveyors and trained prior to conducting the survey.

The survey method used in this study asked respondents to mark 10 tourist destinations, including accommodation, food, and shopping places, in the order they visited them during their stay in Korea. The criteria for selecting tourist destinations for this study were derived from the annual report on the survey of foreign tourists published by the KTO. The tourist destinations most frequently visited by Chinese and Japanese tourists were selected.

Data analysis method

UCINET 6 is a statistical software package for analyzing socio-metric survey data. The package includes NetDraw network visualization. The advantages of the UCINET package include its ability to run a network size of two million nodes. The software has the ability to perform a diverse range of social network analyses, including centrality measures, identification of subgroups, role analysis, permutation-based statistical analysis, and elementary graph theory (Borgatti et al., 2002).

First, a frequency analysis was conducted to identify respondents' profiles. The results are reported in Table 2. Then, UCINET 6 was used to implement a spatial movement analysis, which allowed for an understanding of the visit patterns of Chinese and Japanese tourists to preferred tourism destinations in the Seoul area to develop. Responses were entered into an

attraction-by-attraction matrix in which each cell ij represented whether an individual i reported attraction j as a frequented tourist attraction within the Seoul region. A total of 44 major tourism destinations are located in Seoul or its vicinity. In this study, the top 15 tourism places most preferred by the two national groups were chosen for further study. The matrix was analyzed using in-degree centrality analysis and out-degree centrality analysis in the UCINET software to obtain importance values for each attraction j on the basis of all other tourist groupings' visits to attraction j .

Results

Profiles of the respondents

The demographic characteristics of the study participants are shown in Table 2. The number of male Chinese tourists was 129 (40.2%), and the number of female Chinese tourists was 192 (59.8%). With regard to age, 162 (50%) of the participants were aged 20 to 29 years and 112 (34.9%) were aged 30 to 39 years. Therefore, those aged 20 to 39 years accounted for 85% of the Chinese tourists surveyed in this study. In relation to jobs, workers accounted for 33.6% ($n = 108$) of the participants, students for 20.6%, and housewives for 6.2%. With regard to the Japanese participants, 24.9% ($n = 84$) were male and 75.1% ($n = 253$) were female. In terms of age, 40.1% (135) were aged 20 to 29 years and 18.1% (61) were aged 30 to 39 years, indicating that those aged 20 to 39 years accounted for almost 60% of the Japanese participants; 16.9% ($n = 57$) of the participants were aged between 50 and 59 years. With regard to the current jobs of the Japanese tourists, 43.6% were workers ($n = 147$), 27.3% were students, and 9.5% were housewives.

Table 2. Profiles of respondents

Chinese tourists (n=321)				Japanese tourists (n=337)			
Variable	Category	Frequency	(%)	Variable	Category	Frequency	(%)
Gender	Male	129	40.2	Gender	Male	84	24.9
	Female	192	59.8		Female	253	75.1
Age	10-19	3	.9	Age	10-19	35	10.4
	20s	162	50.5		20s	135	40.1
	30s	112	34.9		30s	61	18.1
	40s	39	12.1		40s	42	12.5
	50s	5	1.6		50s	57	16.9
	Over 60	0	0.0		Over 60	7	2.1
	Workers	108	33.6		Workers	147	43.6
Occupation	Students	66	20.6	Occupation	Students	92	27.3
	Housewives	20	6.2		Housewives	32	9.5
	Other	127	39.6		Other	66	19.6

Tourist attractions most visited by the two national tourist groups

In a questionnaire, the Chinese and Japanese tourists were asked to indicate which tourist destinations they had visited. Table 3 shows the top 15 most visited tourist attractions by national group. The tourist destinations most visited by the Chinese tourists included Myeong-dong (11.8%), Dongdaemun Market (10.7%), duty-free shops in Seoul (9.2%), N Seoul Tower (7.5%), Jamsil Lotte World (6.5%), and the Hongik University area (6.1%). These tourists preferred to visit shopping and entertainment districts. Conversely, the areas most visited by the Japanese tourists were Myeong-dong (20.2%), Dongdaemun Market (11.3%), the Hongik University area (9.4%), Cheongdam-dong Street (8.8%), and Insa-dong (5.7%). The districts preferred by the Japanese tourists included shopping areas, clubbing areas (primarily for young people), boutique shopping areas, and traditional gift shop areas. Both national groups commonly liked visiting shopping areas.

Table 3. Top 15 tourist attractions most visited by the two national groups

Chinese tourists			Japanese tourists		
Visited Tourist Attractions	Frequency	%	Visited Tourist Attractions	Frequency	%
Myeong-dong (S)	253	11.8	Myeong-dong (S)	288	20.2%
Dongdaemun Market (S)	231	10.7	Dongdaemun Market (S)	161	11.3%
Duty-free shops (S)	198	9.2	Hongik University Street (S)	134	9.4%
N Seoul Tower (S)	162	7.5	Cheongdam-dong Street	126	8.8%
Jamsil Lotte World (S)	140	6.5	Insa-dong (S)	81	5.7%
Hongik University Street (S)	131	6.1	Namdaemun Market (S)	77	5.4%
Ancient palaces (S)	127	5.9	COEX (S)	73	5.1%
Insa-dong (S)	98	4.6	N Seoul Tower (S)	69	4.8%
Hanok Village (S)	94	4.4	Duty-free shops (S)	67	4.7%
Gwanghwamun Plaza (S)	65	3.0	Jamsil Lotte World (S)	55	3.9%
Famous restaurants (S)	65	3.0	Hanok Village (S)	54	3.8%
63 Square (S)	59	2.7	Han River Ferry Cruise (S)	47	3.3%
Namdaemun Market (S)	57	2.7	Itaewon (S)	42	2.9%
Itaewon (S)	50	2.3	Ancient palaces (S)	38	2.7%
Cheongdam-dong (S)	47	2.2	Gwanghwamun Plaza(S)	28	2.0%

Note: Top 15 places were calculated on the basis of asking respondents to choose all the places they had visited. All places are located in Seoul.

In-degree centrality analysis of the places most visited by Chinese and Japanese tourists

Figures 3 and 4 show the results of the in-degree centrality analysis of the tourist attractions most frequently visited by Chinese and Japanese tourists. Regarding the Chinese tourists' preferences, the most central attractions were Myeong-dong (CV = 4.502), duty-free shops in Seoul (CV = 4.502), and Dongdaemun Market (CV = 4.502). This indicates that these three attractions were the ones most visited by the Chinese tourists. The next most frequently visited places included Jamsil Lotte World (CV = 3.010), Hongik University (CV = 3.010), N Seoul Tower (CV = 2.512), Hanok Village (CV = 2.014), and Gwanghwamun Plaza (CV = 1.517).

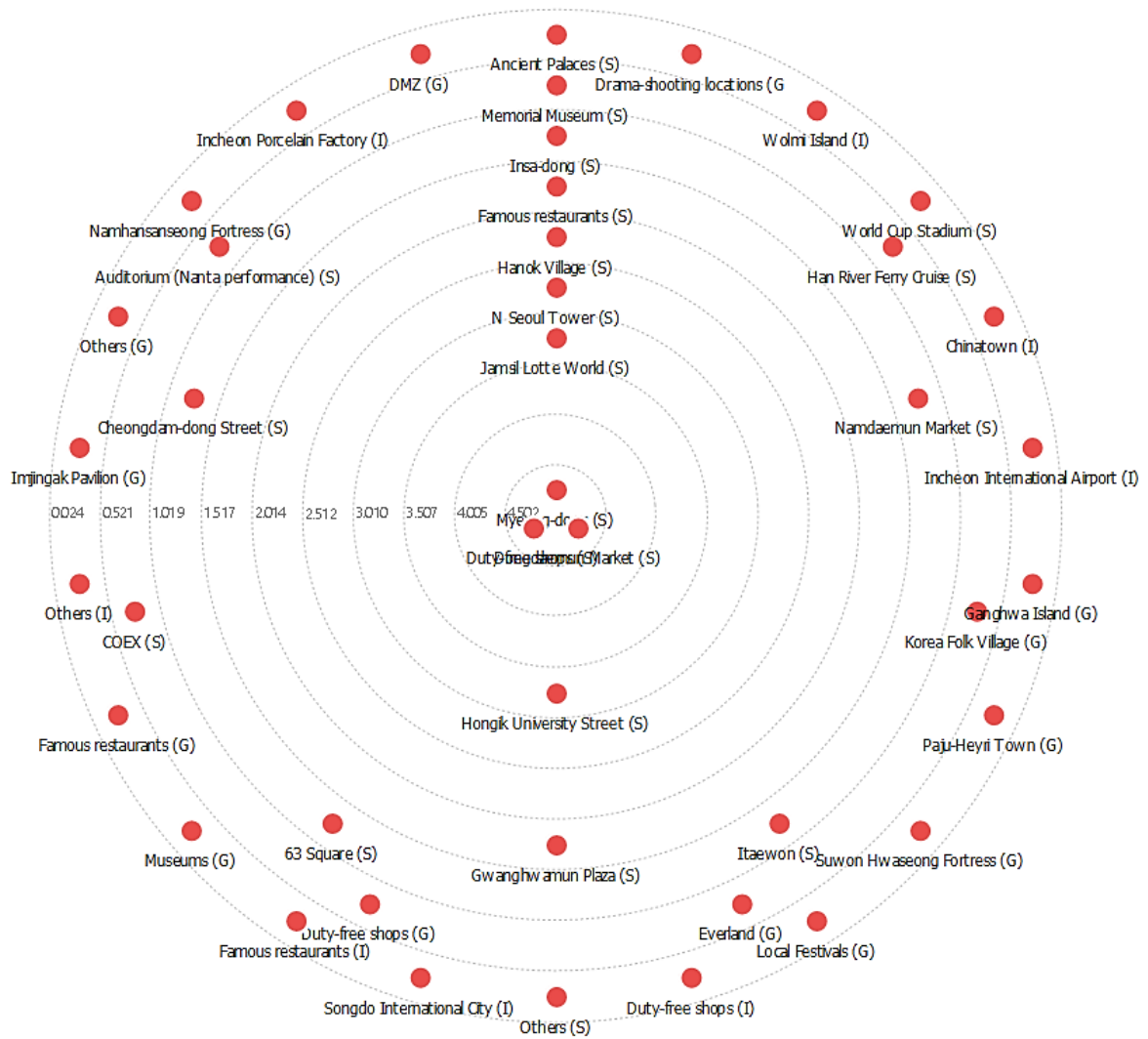


Figure 3. Visual map of the tourist attractions most visited by Chinese tourists

According to the results of the degree centrality centric analysis of the Japanese tourists, the most central attractions included Myeong-dong (CV = 4.200), Donddaemun Market (CV = 4.200), the Hongik University area (CV = 3.267), Cheongdam-dong Street (CV = 3.267), Namdaemun Market (CV = 1.867), duty-free shops in Seoul (CV = 1.867), N Seoul Tower (CV = 1.400), Hanok Village (CV = 1.400), and COEX (CV = 1.400).

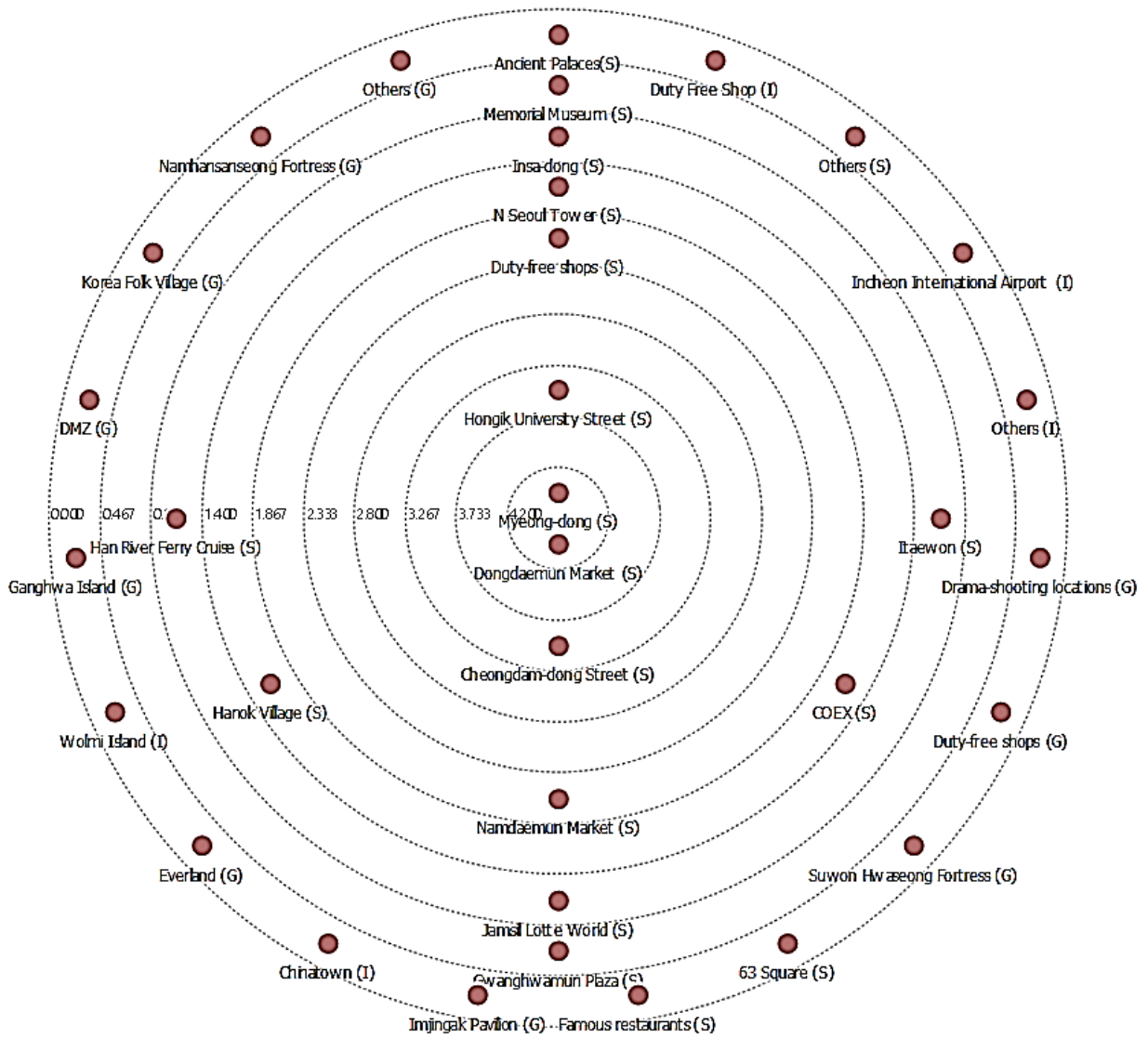


Figure 4. Visual map of the tourist attractions most visited by Japanese tourists

Out-degree centrality analysis of the movement flow between destinations for Chinese and Japanese tourists

Figure 5 indicates the results from analyzing the out-degree of centrality for Chinese tourists. Duty-free shops in Seoul were centrally located in their movement patterns. In analyzing the movement patterns of Chinese tourists, the inflow of tourists to duty-free shops in Seoul came from Gwanghwamun Plaza, Dongdaemun Market, and the Hongik University area. The

outflow of Chinese tourists was concentrated on famous restaurants in Seoul. Tourists in Insa-dong moved from ancient palaces to Myeong-dong and N Seoul Tower.



Figure 5. Analysis of tracking the movement paths of Chinese tourists

Figure 6 shows the results of tracking the movement paths of the Japanese tourists. Myeong-dong is centrally located in this figure. The district was the start point from which these Japanese tourists travelled. Thus, they stayed in hotels around this district or moved there using chartered buses or public transportation. Japanese tourists in Myeong-dong moved to Namdaemun Market, Hongik University Street, N Seoul Tower, and Dongdaemun Market.

Japanese tourists in Myeong-dong moved from Insa-dong. Those in Dongdaemun Market came from Namdaemun Market and Hongik University Street.

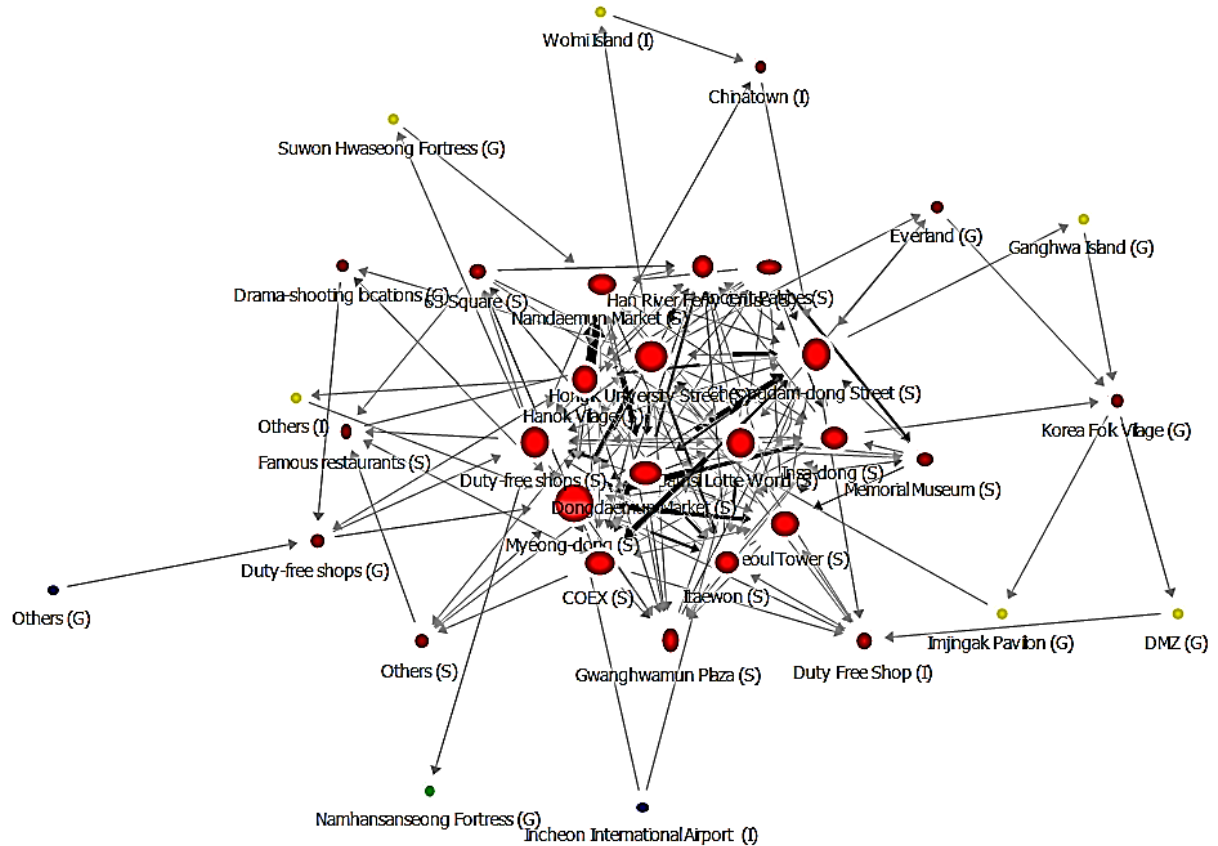


Figure 6. Analysis of tracking the movement paths of Japanese tourists

Moving point analysis of tourist destinations preferred by Chinese and Japanese tourists

To understand the results of examining the movement points through an in-degree centrality and out-degree centrality analysis, it is first necessary to understand the meanings of the numbers that occur between in-degree and out-degree. In this study, it is possible to identify which of the various tourist routes are the start points (out-degree) and the end points (in-degree) in the intra-destination network. The highest in-degree (210) centrality for the Chinese tourists was discovered at Dongdaemun Market, followed by Myeong-dong (in-degree = 194), duty-

free shops in Seoul (in-degree = 194), Jamsil Lotte World (in-degree = 139), Hongik University Street (in-degree = 129), and N Seoul Tower (in-degree = 116). The highest out-degree (210) centrality for the Chinese tourists was at Myeong-dong (out-degree = 248), followed by Dongdaemun Market (out-degree = 221), N Seoul Tower (out-degree = 158), Jamsil Lotte World (out-degree = 132), and Hongik University Street (out-degree = 123). All of these places are located in Seoul.

The highest in-degree centrality for the Japanese tourists was observed at Myeong-dong (in-degree = 154), followed by Dongdaemun Market (in-degree = 144), Hongik University Street (in-degree = 116), and Cheongdam-dong Street (in-degree = 115). This indicates that the district is a frequent end point for Japanese tourists' travel itineraries. In regard to the start points of their itineraries, Myeong-dong (out-degree = 264), Dongdaemun Market (out-degree = 127), Hongik University Street (out-degree = 97), and Cheongdam-dong Street (out-degree = 70) were frequently occurring locations.

In a comparison of the movement paths of these two national groups, similar patterns were found in terms of preference for a few famous tourist attractions which became both start and end points. However, some significant differences were found. The Chinese tourists showed a tendency to visit ancient palaces in their travel itinerary, whereas the Japanese tourists showed relatively low preferences for visiting these palaces. The Chinese tourists frequently ended their travel itineraries at duty-free shops, whereas the Japanese tourists did not. Now that Cheongdam-dong Street was a location much more frequently visited by the Japanese tourists than by the Chinese tourists, this street was both a start point and an end point for the Japanese tourists. When investigating travel range, the Chinese tourists were found to move across a wider range of locations and to visit more attractions than the Japanese tourists. This finding is

similar to the movement paths of both national groups. Like the Chinese tourists' movement patterns, all of these places are located in Seoul. Table 4 shows the study results.

Table 4. Comparison of in-degree and out-degree centrality of Chinese and Japanese tourists

Chinese Tourists			Japanese Tourists		
Visited Tourist Attractions	In-Degree	Out-Degree	Visited Tourist Attractions	In-Degree	Out-Degree
Ancient palaces (S)	18	126	Insa-dong (S)	45	68
Memorial Museum (S)	32	43	Ancient palaces (S)	13	38
Insa-dong (S)	59	97	N Seoul Tower (S)	59	58
N Seoul Tower (S)	116	158	Myeong-dong (S)	154	264
Myeong-dong (S)	194	248	Dongdaemun Market (S)	144	127
Namdaemun Market (S)	57	56	Memorial Museum (S)	16	20
Dongdaemun Market (S)	210	221	Duty-free shops (S)	66	19
Jamsil Lotte World (S)	139	132	Namdaemun Market (S)	66	72
Han River Ferry Cruise (S)	29	26	Itaewon (S)	38	41
Hongik University Street (S)	129	123	Jamsil Lotte World (S)	41	47
Hanok Village (a traditional Korean town) (S)	93	85	Hongik University Street (S)	116	97
Korea Folk Village (G)	30	25	Han River Ferry Cruise (S)	44	44
Drama-shooting locations (G)	8	4	Cheongdam-dong Street (S)	115	70
Itaewon (S)	48	50	COEX (S)	58	48
63 Square (S)	58	55	Duty-free shops (I)	7	5
Duty-free shops (S)	194	93	Hanok Village (a traditional Korean town) (S)	53	34
Famous restaurants (S)	64	18	Drama-shooting locations (G)	5	4
Everland (G)	35	24	Duty-free shops (G)	6	6
Gwanghwamun Plaza (S)	64	58	Suwon Hwaseong Fortress (G)	1	1
Cheongdam-dong Street (S)	43	40	63 Square (S)	12	11
Duty-free shops (G)	25	6	Gwanghwamun Plaza (S)	28	17
COEX (S)	28	22	Famous restaurants (G)	5	1
Wolmi Island (I)	12	12	Imjingak Pavilion (G)	1	1
Auditorium (Nanta performance) (S)	24	22	Chinatown (I)	5	1
World Cup Stadium (S)	7	6	Everland (G)	2	2
Chinatown (I)	18	17	Wolmi Island (I)	1	1
Ganghwa Island (G)	9	9	Ganghwa Island (G)	1	1
Paju-Heyri Town (G)	13	7	DMZ (G)	2	1
Suwon Hwaseong Fortress (G)	6	6	Korea Folk Village (G)	3	3
Duty-free shops (I)	13	9	Namhansanseong Fortress (G)	3	0
Songdo International City (I)	3	2			
Famous restaurants (I)	6	3			
Museums (G)	9	7			

Famous restaurants (G)	10	4
Imjingak Pavilion (G)	4	4
Namhansanseong Fortress (G)	6	5
Incheon Porcelain Factory (I)	4	1
DMZ (G)	1	1

Note: S: Seoul, G: Gyeonggi province, I: Incheon.

Discussion

Some significant discussion points based on the findings of this study arise. First, the most popular areas for both Chinese and Japanese tourists are the Myeong-dong and Dongdaemum areas. At both national and local level, recent data show that Myeong-dong and Dongdaemum are the recipients of the largest inflows of tourists to Korea (KTO, 2016). These areas have important centrality in terms of both geographical location and economic vibrancy in the Seoul region. However, a further comparison of the movement patterns within the multiple tourist intra-destinations visited by the two national groups presented many important patterns. Although duty-free shops in Seoul were the third most visited site for the Chinese tourists, they were the ninth most important for the Japanese tourists.

Cheongdam-Dong Street, popular among the Japanese tourists, was among the least important tourist sites for the Chinese tourists. Famous restaurants and 63 Square, all in Seoul, were important for the Chinese tourists but failed to rank among the top 15 sites visited by the Japanese tourists. By contrast, visits to the Han River Ferry Cruise and COEX in Seoul were predominantly made by the Japanese tourists. In this regard, destination attractiveness has different implications for these two groups. These distinctive core attractions visited by the two groups could inform specific pull motivations to visit the Seoul region (Beerli et al., 2007; Dann, 1981; Klenosky, 2002; Lim & Giouvriss, 2017; Wong et al., 2017).

Second, the Chinese tourists displayed movement patterns that reflected their desire to explore in the Seoul region. The Chinese tourists' explorations are evident both in regards to

the types of attractions visited and the diversity of attractions explored. The range of attractions visited by the Chinese tourists included historical and cultural sites (e.g., ancient palaces, Hanok Village), observatory place places of interest (e.g., N Seoul Tower), shopping and entertainment centers (e.g., Jamsil Lotte World), culinary venues, and cruise tours. Thus, Chinese tourists showed a tendency to seek new experiences, whereas the Japanese tourists exhibited spatial concentration and limited exploration. However, spillover effects were seen around central attractions within Myeon-dong. The Japanese also seem to have a preference for specific types of attractions—shopping and exhibitions centers (e.g., COEX), markets and street food (e.g., Hongik University area), and fashion and K-Pop (e.g., Cheongdam-dong Street)—rather than attractions in general. For Japanese tourists, shopping is an important pastime (Kim et al., 2011b).

Also, the movement pattern of the Japanese tourists shows restricted movement behaviors within Myeong-dong and Dongdaemum. By their spatial movement patterns, the Japanese tourists displayed higher uncertainty avoidance in their movement behaviors. Geert Hofstede's uncertainty avoidance index for Japan within the framework of the cultural dimensions theory places the Japanese in the high risk avoidance cohort (index=92), whereas the Chinese engage in risk-prone behaviors and thus display lower uncertainty avoidance (index=30) (www.hofstede-insights.com/country-comparison). From the cultural dimensions perspective, the movement patterns of these national groups can also be informed and understood from the perspective of spatial and cultural stereotypes. Therefore, the attractiveness of destinations to tourists is not only related to risk avoidance behaviors but also influenced by national stereotypes (Crotts & Erdmann, 2000; Kim & McKercher, 2011; Litvin et al., 2004; Reisinger & Crotts, 2010).

However, the spatial concentration of the Japanese tourists within the vicinities of Seoul manifests an apparent disinterest in detailed exploration among the Japanese cohort. The Chinese tourists, on the other hand, exhibited a greater spatial spread within the Seoul area. Such findings establish a premise for the assumption that Chinese tourists are perhaps more interested in, and inclined to visit, a number of attractions in Seoul than Japanese tourists. According to previous studies, Japanese tourists tend to travel in areas dominated by shopping activities during their travels (Henderson, 2017; Kim et al., 2011b).

In addition, the comparison of degree centrality for destinations frequently visited by the two national tourists is conducive to a vital point of discussion. The use of in-degree and out-degree provides a point of reference within the directional network by comparing the two markets. The more substantial differences in terms of places to visit for Chinese tourists were in regard to ancient palaces, Insa-dong, N Seoul Tower, and Myeong-dong, where out-degree exceeded in-degree, and duty-free shops and famous restaurants in Seoul, where in-degree exceeded out-degree: that is, many Chinese tourists were found to include cultural attractions in the final phases of their itineraries. Japanese tourists, on the other hand, tend to visit places like Myeong-dong toward the end of their itineraries. Concerning the routes of Chinese tourists, duty-free shops in Seoul are central and feature tourist inflows from Gwanghwamun Plaza, Dongdaemun Market, and Hongik University Street. The outflow of Chinese tourists is concentrated around famous restaurants in Seoul.

Implications of this study

Spatial interaction models prescribe that attractions exist in a given space and that their interactions are measurable by the flow of economic or social activities with that space (Marrocu & Paci, 2013; Smith, 1975). The implications of this study are as follows. First, the

study is important for developing tourism promotion and forecast strategies for tourist destinations. Because the two national groups studied exhibited distinctive preferences for different attractions, the host destination should be able to forecast the proportions of visitors to these attractions for the national groups. While certain destinations were attractive to one group of visitors, these were less important to the other group. For Japanese tourists, it is more meaningful to develop marketing strategies that project pleasure and entertainment, such as the K-Pop culture, whereas more diverse promotional campaigns could be targeted towards Chinese tourists. Cheongdam-Dong, which is a fashion (celebrity) street in Gangnam, could be promoted for this national group (Kim et al., 2013; Pan et al., 2014; Wang et al., 2018).

Second, by analyzing the spatial mobility and interactions of tourists for different attractions, we are able to detect the spatial density and spread of tourists. Identifying the spatial density of tourists can make the difference between successful and unsuccessful destinations (Marrocu & Paci, 2013; Mings & McHugh, 1992). Specifically, this information is vital for developing new tourist routes and alternative attractions. Alternatively, this information is also vital to spread tourism to lesser known areas. Because, as seen in this study, specific attractions have unique appeal to different national groups, the right types of attractions need to be developed. In this sense, social network analysis also serves as a viable tool for spatial movement analysis (Hong et al., 2015).

Third, the use of social network analysis fosters the detection of which nodes (attractions) have greater congestion. Over the past decade, congestion at tourist attractions has increasingly become a problem associated with tourism development at mature destinations (Albaladejo & González-Martínez, 2018; Riganti & Nijkamp, 2008). To address this, a micro-level tourist area lifecycle based on national appeal of attractions can help to focus attention on which market to control or encourage. Evidence from this study supports the notion that

attractions do not attract national groups in the same proportion. This knowledge can contribute to spreading tourists to other areas by developing attractions that conform to their national stereotypes.

Fourth, the study provides data for the development of customized tourism packages and products and also induces the more active use of this information by collecting and analyzing the tourism patterns of individual international tourists at the regional, city, and individual tourist destination levels. The use of spatial interaction modelling implies that the economic importance of destinations can be reflected in the interspatial movement from one attraction to another. Destinations are therefore able to develop attractions and alternative attractions on the basis of the analysis of the spatial density and clusters of tourists within a destination (Vu et al., 2015; Zheng et al., 2012) by predicting which routes record greater tourist density.

Also, this study makes it possible to determine the range of services suited for specific attractions. Appropriate communication and information services, such as signage, language translators, and bilingual skills, can be adopted at attractions if service providers identify the cohorts of tourists moving to and within a given destination (Shih, 2006; Tran et al., 2016). Similarly, restaurants, fashion shops, art galleries, and accommodation providers are among the many services to benefit from such knowledge by providing services consistent with the demands of specific dominant countries. Independent tourists interested in socialization with their national counterparts will also be able to plan their itinerary according to the movement points identified in the study.

In addition, future transport development may also be informed by the details of this study. Destinations are able to better plan transportation services by understanding the spatial movement behaviors of tourists. The development of alternative transport networks for

congested or remote attractions, the management and control of better traffic conditions, and the provision of auxiliary transportation services such as bus terminals are among the pro-tourism transportation benefits ensuing from knowledge of the application of this type of methodology. Private transport businesses, including taxi, mini-buses, tourist coaches, and other commercial transport services, can benefit from this knowledge. Bus timetables can also be amended in relation to the movement pattern of tourists.

The penultimate contribution of this study is that it is possible to link tourist destinations and conduct joint marketing by providing movement pattern information at the city and tourist destination levels in order to improve the effectiveness of the marketing activities of individual tourist destinations. Neighboring destinations and attractions may also benefit from the spillover effects of their competitors (Szytniewski et al., 2017; Zhang & Qu, 1996). Thus, destinations can be competitive partners to their mutual advantage.

Finally, the study also has theoretical implications for understanding destination attractiveness. First, although the social network analysis approach has been applied in communication and technology disciplines, its application in tourism is still rare. This study applied social network analysis in modelling the interspatial flow of tourists from two important markets to Korea. This study thus adds to, and expands our knowledge regarding the use of intra-destination network analysis to investigate the spatial movement of tourists. Second, as shown in this study, pictorial depictions of the movement of tourists is useful for understanding tourists' geo-spatial density and therefore provides information on the importance of attractions to tourists. Third, the study contributes a geo-spatial perspective to an important question within the tourism literature regarding whether attractions attract tourists (Hong et al., 2015; McKercher et al., 2006). To understand the importance of attractions to the attractiveness of destinations, spatial interaction modelling with attention to tourists' spatial

concentration and fluidity should be considered. In light of the fact that the attractiveness of a destination means different things to people of different nationalities, national stereotypes such as uncertainty avoidance may provide information on destination attractiveness. Ultimately, attractions have various levels of importance to national groups.

Conclusion and suggestions for future studies

This study aimed to identify the destinations in Seoul and its vicinity most frequently visited by Chinese and Japanese tourists and to track the spatial movement patterns of these tourists through the application of a network analysis. The current study revealed that spatial considerations are important in tourists' movements. It is evident from the degree centrality analysis conducted in this study that Chinese and Japanese tourists set varying premiums on specific attractions and destinations to visit when in Seoul. It is also apparent that Chinese tourists display a more diverse movement pattern compared to Japanese tourists, who are more centralized around the Myeong-dong vicinity. The centrality of these places corresponds to Japanese tourists' interest in shopping-related activities (Kim et al., 2011b). Chinese tourists are also observed to travel longer distances than their Japanese counterparts.

This study has some limitations. The study did not analyze differences in destination choices or preferences for destination routes according to the detailed characteristics of the two national tourist groups. For example, preferred destination routes will differ according to purpose of travel (Agrusa & Kim, 2008; Agrusa, Kim & Wang, 2011; Kim & Agrusa, 2008; Kim & Prideaux, 2005; Kurtulmuşoğlu & Esiyok, 2017), first time visitors vs repeat visitors (McKercher et al., 2012), and length of stay (Gokovali et al., 2007; Kozak et al., 2017). Therefore, future studies should examine whether or not the routes preferred by these two national groups are distinct according to their profiles. Another point of discussion worthy to

be explored in future studies are the drivers factors and mechanisms of spatial mobility among tourists.

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