

블로그 텍스트 데이터를 활용한 1, 2기 신도시 공원의 이용자 경험 분석 연구

A Study on the Analysis of Park User Experiences in Phase 1 and 2 Korea's New Towns with Blog Text Data

심주영*, 이민수**, 최혜영***

*퍼블릭어라운드(주) 대표, **퍼블릭어라운드(주) 소장, ***성균관대학교 건설환경공학부 부교수

Sim, Jooyoung*, Lee, Minsoo**, Choi, Hyeyoung***

*Chief Director, Public Around

**Director, Public Around

***Associate Professor, School of Civil, Architectural Engineering, and Landscape Architecture, Sungkyunkwan University

Received: May 11, 2024

Revised: May 24, 2024 (1st)

June 11, 2024 (2nd)

Accepted: June 11, 2024

3인익명 심사됨

Corresponding author :

Hyeyoung Choi

Associate Professor, School of

Civil, Architectural Engineering,

and Landscape Architecture,

Sungkyunkwan University,

Suwon, 16419, Korea

Tel.: +82-31-290-7848

E-mail: hyeyoung@skku.edu

국문초록

본 연구의 목적은 신도시 근린공원 이용자 경험의 특징을 고찰하고 도시공원의 경험을 다양하게 하는 이슈를 탐색하는 것이다. 다량의 공원 이용자 경험을 정량적으로 분석하기 위하여 소셜 미디어 가운데 텍스트를 기반으로 하는 네이버 블로그 리뷰를 수집하여 분석하였다. 분석 대상은 1, 2기 신도시 가운데 가장 이용자 경험 포스팅이 높은 공원을 도시별로 하나씩 선정하였다. 수집 기간은 2003년 5월 20일부터 2022년 5월 31일까지이며, 일산호수공원, 분당울동공원, 광교호수공원, 동탄호수공원을 대상으로 분석을 실시하였다. 주요 연구 결과는 다음과 같다. 첫째, 공원 이용자는 네 개 공원 모두에서 일상적인 휴식과 레크리에이션이 중심 활동으로 나타났다. 둘째, 주거지 주변 근린공원임에도 가족단위뿐 아니라 친구, 연인 등 다양한 사용자 그룹이 확인되었다. 셋째, 공원 주변의 도시 프로그램 또한 공원 이용에 영향을 미쳤다. 넷째, 각 공원별 고유의 시설과 프로그램이 공원에 대한 설명력을 높였다. 마지막으로, 공원별 사용자 특성이 네 가지 유형으로 나타났으며, 공원에 따라 네 가지 유형의 네트워크가 다르게 나타났다. 본 연구는 다음 두 가지 시사점을 제공한다. 첫째, 공원의 자연주의적 특성뿐 아니라 각 공원 고유의 시설과 프로그램의 차별성은 대중의 인식을 크게 향상시키고 개별 공원 경험을 풍부하게 한다. 둘째, 텍스트 분석뿐 아니라 공간정보를 기반으로 한 공원 주변 맥락에 대한 분석이 함께 수행된다면 텍스트 데이터 분석 결과에 대한 해석의 정확성을 높일 수 있다. 본 연구의 결과는 현재 진행 중인 3기 신도시의 공원 및 녹지공간 계획 및 설계에 활용될 수 있다.

주제어: 소셜미디어, 텍스트 마이닝, 계획 및 설계, 공원 및 녹지공간, 공원 프로그램

ABSTRACT

This study aims to examine the characteristics of the user experience of New Town neighborhood parks and explore issues that diversify the experience of the parks. In order to quantitatively analyze a large amount of park visitors' experiences, text-based Naver blog reviews were collected and analyzed. Among the Phase 1 and 2 New Towns, the parks with the highest user experience postings were selected for each city as the target of analysis. Blog text data was collected from May 20, 2003, to May 31, 2022, and analysis was conducted targeting Ilsan Lake Park, Bundang Yuldong Park, Gwanggyo Lake Park, and Dongtan Lake Park. The findings revealed that all four parks were used for everyday relaxation and recreation. Second, the analysis underscores park's diverse user groups. Third, the programs for parks nearby were also related to park usage. Fourth, the words within the top 20 rankings represented distinctive park elements or content/programs specific to each park. Lastly, the results of the network analysis delineated four overarching types of park users and the networks of four park user types appeared differently depending on the park. This study provides two implications. First, in addition to the naturalistic characteristics, the differentiation of each park's unique facilities and programs greatly improves public awareness and enriches the individual park experience. Second, if analysis of the context surrounding the park based on spatial information is performed in addition to text analysis, the accuracy of interpretation of text data analysis results could be improved. The

results of this study can be used in the planning and designing of parks and greenspaces in the Phase 3 New Towns currently in progress.

Keywords: Social Media, Text Mining, Planning and Design, Park and Greenspaces, Park Programs

1. Introduction

1.1 Research Background

The term “New Towns”, as ubiquitously employed in the Korean context, denotes a constructed urban center at the periphery of the sprawling in the Seoul Metropolitan Area (SMA). New towns are designed to strategically alleviate population congestion within the highly populated area. The development of New Towns was initiated during the late 1980s and had persisted until the mid-1990s (Cho, n.d.; Yoon et al., 2020). In the late 1980s, housing prices in Seoul were skyrocketing, causing some serious social concerns. In response, the Korean government embarked on an ambitious initiative to establish new cities in five areas in SMA: Bundang, Ilsan, Pyeongchon, Sanbon, and Jungdong. Phase 1 New Towns focused primarily on housing provision but was not able to meet the desired quality standards for residential areas. This initial effort brought various issues, most notably an imbalanced land use, high property values, and traffic congestion. Acknowledging these issues, Phase 2 New Towns emphasized comprehensive planning and post-development framework that systematically focuses on development equity. The New Towns developed during Phase 2 include ten areas strategically dispersed in SMA (Cho, n.d.; Phase 2 New Town Development Details, 2017; Yoon, 2019). Initiated in 2001, projects for Phase 2 New Towns have made substantial progress toward their objectives.

Even before Phase 2 New Town was completed, New Town projects in Phase 3 began in 2018 and aimed at reinforcing the housing policy stance by providing more housing supplies to solve the ever-increasing real estate prices (Song and Kim, 2019). Therefore, the New Towns in Phase 3 were decided to build near the City of Seoul than those built in Phases 1 and 2 (Gu et al., 2021; Hwang and Kim, 2023). Since the Phase 3 development, New Town projects focused more on the quality of the residential environments and public interests, going beyond the mere objective of increasing housing supply.

Although the planning and design of New Towns require community-level efforts, only a handful studies have tried to document user experiences and their associated outcomes in these areas: Kim (2007) evaluated the planning principles against what’s called “sustainable new town planning criteria” for the cities in the first phase. Yoon (2019) conducted an in-depth expert survey to formulate planning indices and developmental trajectories for Phase 3 New Towns. Additionally, the Land and Housing Corporation (LH) in Korea, the main agency to implement New Town projects, assessed the residents’ quality of life in Phases 1 and 2 New Towns, to understand resident satisfaction of their settlement environment as well as planning components (Yoon et al., 2021). Previous studies have mainly derived results based on indicators such as transportation planning, pedestrian infrastructure, and greenspace ratios from an urban planning perspective. The metrics to evaluate the planning and design outcomes from the development of New Towns are crucial to ensure the success of the development and to inform its future practice. However, the comprehensive evaluation metrics, including user experiences, have not been studied or established, especially for the public space sector including parks and greenspaces as part of new urban fabric. Most research on parks and greenspaces in New Towns focuses on their physical systems. Kim and Choi (2013) found that the consistency between the park greenspace system and the urban street system is closely related to the comfort and sustainability of New Towns. The Phase 1 New Town exhibited less reciprocity between the two, with greenspaces distributed within the city. In contrast, Phase 2 New Town showed relatively high consistency, with qualitative improvements to connect existing greenspace resources. Choi and Jeong (2014) analyzed the types and spatial

characteristics of greenspaces as facilities, finding that the type and location of green facilities vary depending on the spatial characteristics of the sites and the land use near the greenspaces, significantly impacting residents' experiences.

Meanwhile, several studies have explored users' experiences and perceptions with text data analysis method within Seoul's prominent neighborhood parks rather than those in New Towns. Woo and Suh (2018) investigated changes in park utilization patterns over time at the Olympic Park. Lee and Son (2021) employed Google Maps reviews to scrutinize user experiences across Seoul Forest, Boramae Park, and Olympic Park. Sa (2024) affirmed public perceptions of urban parks along the Han River, including Seoul Forest, Seonyudo Park, and Yeouido Park. Additionally, Kim (2023) analyzed blog texts focusing on Trukseom Hangang Park to uncover consumption experience patterns in urban parks.

Given that Phase 1 and 2 New Towns are also developing comprehensive urban environments akin to Seoul, it is imperative to extend such studies to include parks and green spaces within these areas as representative urban parks.

1.2 Research Purpose

In response to this research gap, this study aimed to analyze park visitors' experiences in Phase 1 and 2 New Towns with Naver Blog text data quantitatively. The analysis of social media text data is useful for understanding user perceptions and usage patterns through user experience reviews (Kaußen, 2018; Munawir et al., 2019; Song and Zhang, 2020; Huang et al., 2022; Park et al., 2022).

The structural framework of the Phase 3 New Towns district plan, encompassing land use and district unit arrangements, has been officially formulated as of 2023 (Hwang and Kim, 2023). Nonetheless, to create a park that resonates with its potential users, it is important to understand how individuals engage with the park and how they perceive and interact with its attributes. The result of this study could provide a comprehensive landscape planning strategy to improve users' perceptual engagement with parks and greenspaces during the development of the Phase 3 New Town's green infrastructure as reflections of previous development.

2. Materials and Methods

2.1 Study Area

The research objects encompass neighborhood parks in two distinct urban locales: Ilsan and Bundang, which are emblematic of Phase 1 New Towns, and Dongtan and Gwanggyo, which are emblematic of Phase 2 New Towns (See Figure 1). Ilsan and Bundang originated in the early 1990s. They conferred approximately three decades of maturation to these localities, rendering consolidated residential domains complemented by an environment characterized by congenial parks and greenspace attributes. Gwanggyo and Dongtan, illustrative of Phase 2 New Towns, were started to build in the 2000s. Phase 2 New Towns formulation systematically infused an expanded network of parks and greenspaces into the urban schema, underpinning a concerted effort to improve the quality of the residential milieu (See Table 1).

The selection of parks for the analysis was performed by assessing the number of blog posts ascribed to each neighborhood park within these four cities. The underlying assumption is that highly used places will likely have more posts. Four search terms, including "Ilsan Park", "Bundang Park", "Gwanggyo Park", and "Dongtan Park", were each queried on Naver, the largest and the most popular search engine and blog service in South Korea (Lee and Son, 2022), to gather blog URLs about the parks from May 20, 2003, marking the initiation of Naver's service, to May 31, 2022. A series of scraping and filtering methods were applied to acquire complete lists of search results, resulting in 132,328 URLs and metadata, including the post title. Within the lists, the number of blog posts containing the name of each major park was counted, as shown below (See Table 2). The parks with the most posts in each city and their ratios are as follows: Ilsan Lake

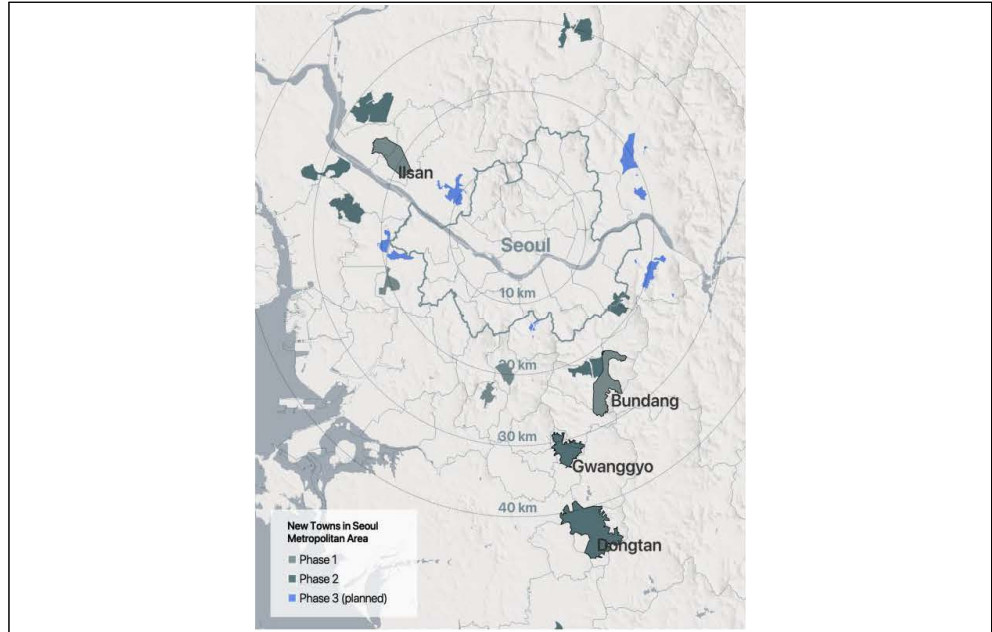


Figure 1. Geographic overview of Phase 1 and 2 New Towns in SMA

Table 1. Overview of Phase 1 and 2 New Towns

Variables	Phase 1 New Towns		Phase 2 New Towns		
	Ilseong	Bundang	Gwanggyo	Dongtan 1	Dongtan 2
Planning area size	1573.6ha	1963.9ha	1,130ha	990ha	2,440ha
Planning population	276,000	390,000	78,000	126,000	286,000
Construction period	'90.3-'95.12	'89.8-'96.12	2005-2019	2001-2018	2008-2021
Housing ratio	33.5%	32.4%	18.99%	30.9%	30.38%
Commercial ratio	7.84%	8.38%	5.53%	3.97%	5.97%
Greenspace ratio	23.5%	19.4%	22.46%	24.28%	26.34%

Source: Yoon et al., 2020

Table 2. How to select four parks for the study

Ilseong (count/%)		Bundang (count/%)		Gwanggyo (count/%)		Dongtan (count/%)	
Ilseong lake	17,585 (99.3%)	Bundang Yuldong	5,234 (51.8%)	Gwanggyo Lake	10,154 (97.8%)	Dongtan Lake	2,339 (52.0%)
Jeongbal-san	98 (0.6%)	Central	4,866 (48.1%)	Central	229 (2.2%)	Nojak	1,493 (33.2%)
Goyong Eco	20 (0.1%)	Tapgol	6 (0.1%)			Yeoul	365 (8.1%)
Baekseok neighborhood	7 (-)					Central	273 (6.0%)
						Chidong-cheon	30 (0.6%)
						Banseok-san	2 (0.1%)

Park (99.3%), Bundang Yuldong Park (51.8%), Gwanggyo Lake Park (97.8%), and Dongtan Lake Park (52.0%).

2.2 Text mining

2.2.1 Data acquisition and preprocessing

Per the site selection process, Ilsan Lake Park, Bundang Yuldong Park, Gwanggyo Lake Park, and Dongtan Lake Park were decided as the research objectives. An overview of these four neighborhood parks is shown below (See Table 3).

The retrieval period of text data for the analysis was the same as for the site selection, from May 20, 2003, marking the initiation of Naver's service, to May 31, 2022. The information extracted included post titles, dates of publication, and body text (docs obtained, ①). Data analysis was performed using the Python programming language.

To enhance the credibility of the collected data, posts associated with real estate and commercial advertising (i.e., "#housing sales", "#real estate agency"), including duplicates, were eliminated. Moreover, words recurrent in promotional content, such as "#flower shop", "#hair shop", and "#auction", were meticulously identified and omitted if they surfaced even once in the text (docs screened, ②). To isolate posts specifically referencing the park for the analysis from the posts that remained after screening, only those posts containing the specific park names in their titles, namely Ilsan Lake Park, Bundang Yuldong Park, Gwanggyo Lake Park, and Dongtan Lake Park – were selected (docs relevant, ③).

The total number of posts relevant to the parks considered in the analysis was 53,965 (all relevant docs). Subsequently, tokenization was employed for frequency and network analyses. The unique token counts (tokens unique, ④) utilized in the calculation of term frequency–Inverse Document Frequency (TF–IDF) are presented below (See Table 4).

2.2.2 Text mining and visualization

In this study, topics within each park's corpus were identified and analyzed through keyword extraction using the TF–IDF method. In addition, we employed Word2Vec–based word embeddings to discern the contextual meanings and correlations among keywords within the corpus. TF–IDF contains various formulations tailored for specific analytical purposes and corpus characteristics. In this study, a title–weighted TF–IDF, denoted as twTF–IDF, was utilized. In this approach, text from blog titles is incorporated into the TF–IDF calculation as distinct documents and specific weights are assigned to words emphasized by blog

Table 3. Overview of four parks selected for the study

	Ilsan Lake park	Bundang Yuldong Park	Gwanggyo Lake Park	Dongtan Lake Park
Area size	103ha	30ha	17ha	181ha
Completion date	Yr. 1996	Yr. 1999	Yr. 2013	Yr. 2018

Table 4. Number of blog text data by processing funnel

Search keywords	Ilsan Lake Park	Bundang Yuldong Park	Gwanggyo Lake Park	Dongtan Lake park
Docs obtained (①)	36,280	37,666	29,283	29,099
Docs screened (②)	31,530	28,487	20,896	14,582
Docs relevant (③)	22,791	10,498	15,042	5,634
Tokens unique (④)	294,691	188,687	239,425	132,484
Tokens in total	3,564,040	1,852,446	2,506,922	1,073,466

authors as focal points.

For word embeddings, a range of algorithms, from traditional Word2Vec to BERT-based Sentence-BERT, were considered. The resulting vectors in \mathbb{R}^d , which represent a matrix of several words derived using Word2Vec, encapsulate the compressed semantic space within the d dimensions of the corpus. A dimension-reduction algorithm is applied to visualize the space. Notably, after experimenting with well-known techniques such as Principal Component Analysis (PCA), t-distributed Stochastic Neighbor Embedding (t-SNE), and Multidimensional Scaling (MDS) for 2D compression, MDS demonstrated the best fit for the objectives of this study.

3. Results

3.1 Blog Data Text Mining

3.1.1 Keywords frequency

To investigate people’s utilization and perception of parks within Phase 1 and 2 New Towns, a keyword frequency analysis (N=50) was conducted for each park, yielding valuable insights. Table 5 lists the 20 keywords with the highest validity, and Figure 2 shows the percentage of the text group with the same characteristics.

The findings revealed that all four parks were used for relaxation and recreation. Notably, “strolling” and “outing” emerged as the most frequently used words in the $tf \times idf$ frequency analysis, ranking in the top three in all four parks. In Ilsan Lake Park and Bundang Yuldong Park, “strolling” ranked 1st and 2nd, respectively, while “outing” ranked in the opposite direction. In Gwanggyo Lake Park and Dongtan Lake Park, “strolling” consistently held first, while “outing” ranked 3rd in both parks.

Situated within New Town areas, these parks were categorized as “neighborhood parks” under the “Act on Urban Parks and Green Areas (2016)” in Korea. While the four New Town parks are relatively substantial at over 50 ha (except Bundang Yuldong Park), they operate as daily greenspaces within residential locales, diverging from the concept of large theme parks. Apart from “strolling” and “outing,” common park activities encompassed “bicycle,” “exercise,” “walking,” and “picnic”. Importantly, posts related to the park experience during “spring” and “autumn” were prevalent and landscape elements such as “flower” and “cherry blossom”

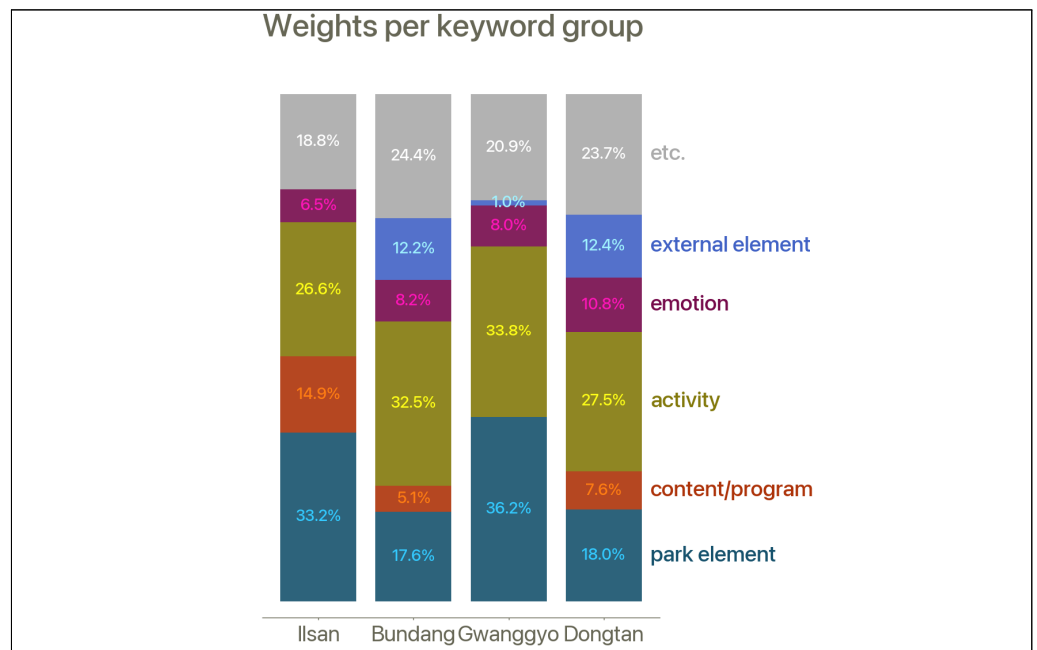


Figure 2. Weights composition of keyword categories per park

Table 5. Top 20 keywords with a high twTF-IDF score

	Ilsan Lake Park (token / twTF-IDF)		Bundang Yuldong Park (token / twTF-IDF)		Gwanggyo Lake Park (token / twTF-IDF)		Dongtan Lake Park (token / twTF-IDF)	
	Keyword	Score	Keyword	Score	Keyword	Score	Keyword	Score
1	Outing	726.9	Strolling	270.2	Strolling	649.6	Strolling	129.4
2	Strolling	689.0	Outing	209.6	Night_view	499.8	Luna show	69.4
3	International Flower Festival	595.3	Bungee_jump	137.6	Outing	478.2	Outing	58.5
4	Flower	472.7	Autumn	135.3	Shindae lake	216	Night view	52.5
5	Cherry blossom	457.1	Book theme park	114.6	Date	209.6	Lake como	50.6
6	Singing Fountain	434.5	Kid	92.3	Walking	200.4	Kid	50.3
7	Autumn	386.2	Hanging out with lovers	85.8	Campsite	195.6	Walking	35.2
8	Spring	340.2	Duckling	71.6	Kid	194.5	Many	29.3
9	Bicycle	329.4	Spring	69.9	Woncheon lake	183.8	Autumn	28.1
10	Scenery	301.7	Scenery	69.4	Autumn	167.6	Parking lot	28
11	Rose	293.9	Walking	68.3	View tower	164.8	Parking	26.1
12	Rose garden	269.6	Central park	67.2	Sunflower	164.6	Fountain show	25.3
13	Kid	262.8	Parking_lot	65.7	Bicycle	144.9	Picnic	24.5
14	See	247.3	Many	59.5	Family	143	Hanging out with lovers	23.9
15	Walking	247	Autumn colors	58.9	Nighttime	141.4	Shopping mall	23.7
16	Hanging out with lovers	235.2	Family	58.6	Parking lot	140.9	Spring	21.8
17	Festival	197.3	Cherry blossom	56	Many	119.6	Family	21.3
18	Many	196.3	[C]	50.9	Exercise	118	Seat	21.2
19	Night_view	188.3	[C]	50.7	Road	111.7	Road	20.9
20	Show	182.3	Parking	49.5	Spring	111.4	Cherry blossom	20.3

Legend: [C] Commercial, mostly food and beverage related

came up in all four parks, indicating the significance of the “Landscape” factor in shaping the park usage experience.

Second, the analysis underscores park’s’ diverse user groups. All four parks were conveniently situated near residential areas, ensuring accessibility for the general public. Notably, “kids” and/or “family” consistently rank within the top 20 keywords across all four parks in frequency analysis except Ilsan Lake Park. This prevalence indicates park’s appeal to family-oriented user groups, aligning with the overarching demographic focus of Phase 1 and 2 New Towns, which primarily cater to middle-class and young families.

Interestingly, in Bundang Yuldong Park, the phrase “hanging out with lovers” holds similar rankings (7th) compared to “kids” (6th) and much higher than “family” (16th). This observation suggests a notable emphasis on recreational activities among couples visiting parks. Moreover, neighborhood parks in Phase 1 and 2 New Towns serve as versatile spaces catering to various user groups. In addition to their family-centric leisure and relaxation functions, these parks operate as multipurpose hubs that foster interactions with surrounding commercial districts.

Third, the programs for parks nearby were also related to park usage. In Bundang Yuldong Park and Dongtan Lake Park, a significant portion of the high-frequency words pertained to park external elements (abbreviated as [C]), often accompanied by the term ‘famous restaurant’ and/or ‘shopping mall,’ representing external elements within the park’s vicinity. Specifically, Bundang Yuldong Park accounted for 12.2% and Dongtan Lake Park accounted for 12.4%.

Fourth, compared to the frequently occurring terms “strolling” and “outing”, the words within the top 20 rankings represented distinctive park elements or content/programs specific to each park. For instance, at Ilsan Lake Park and Bundang Yuldong Park, the terms “International Flower Festival”, “Bungee Jumping”, “and” “Book Theme Park” ranked high. In Gwanggyo Lake Park, “Shindae Lake” and “Woncheon Lake”, “the original lakes in the park, were ranked within the top 10, along with the park’s unique programs such as” “campsite”. “In Dongtan Lake Park, “Luna Show” and “Lake Como”, the shopping mall, appear in the second and fifth positions, respectively.

These words, pertaining to each park’s exclusive elements and content/programs, establish a robust network that constitutes the park’s unique characteristics that are discernible to visitors. The recognition of these characteristics was further substantiated through network analysis, as discussed in the subsequent section.

3.1.2 Network Analysis

Through the network, distinct user scenarios within the park were identified based on representative keywords that illuminated the park’s essence. This network was visualized as a 50-word (token) network derived from twTF-IDF, with the font size of each token proportional to its twTF-IDF value. In this network, an intertoken edge was drawn when the cosine distance of the word embeddings fell within the top 200 (approximately 0.1% of the total), with the width of the edge representing the relative similarity.

The results of the network analysis delineated four overarching types of park users. The first group (G1) comprised individuals engaging in everyday leisure activities within the park, including strolling and outings, which describes an experience centered on user behavior. The second group (G2) encompassed users attracted to park events and content, such as fairs and festivals, located around the purpose of the user’s visit. The third group (G3) comprised individuals who appreciated and enjoyed the natural elements, plants and scenic views of the park, an essential aspect from a research point of view as it relates to the natural things of the park. The last group (G4) primarily utilized nearby commercial facilities, including restaurants, which focused on the use of external facilities.

Specifically, Ilsan Lake Park exhibited characteristics primarily aligned with the G2 type, emphasizing the “International Flower Festival (IFF)”. Related terms like “event”, “exhibition”, and “festival” formed a cohesive network within this group. The park’s thematic focus on flowers and plants was evident through the inclusion of various plant species such as “rose”, “cherry” and “tulip”. The G3 group, appreciative of nature and landscapes (such as “flower viewing”, “scenery”, “sunset,” and “sundown”), formed distinct clusters in association with the G2 type (See Figure 3). The G1 group, centered around daily leisure activities (such as “bicycle,” “exercise,” and “strolling”), was also shown clearly.

While Ilsan Lake Park was characterized by a prominent focus on content and programs, indicating a strong presence of G2 type users, Gwanggyo Lake Park mainly featured a diversity of leisure activities within the park, aligning with G1 type. Gwanggyo Lake Park was characterized by its comparatively low proportion of content and programs. Instead, the park’s main perceived features among park-goers were its park elements (“camp site”, “view tower”) and specific locations (“Woncheon Lake” and “Shindae Lake”, existing lakes within the park boundary). The G1 type words in Gwanggyo Lake Park spanned a wide range, including “bicycle”, “photo trip”, “excursion”, “camping”, and “walking”. However, these terms exhibited low interrelations and did not form discernible cohesive groups. In Gwanggyo Lake Park, networks by the location – “night view” at “Shindae Lake”, “view tower” at “Woncheon Lake” and “outing” at “campsite” – were observed (See Figure 4).

shopping mall near the park (G4), was prominent but had weak connections to other aspects of the park. However, it is understood that it plays a significant role in park users recognizing the park.

4. Discussion

4.1 Elements that Expand the User Experiences of the Park: Originality and Diversity

The user experiences of the four New Town parks revealed the originality of the city park's attributes and functions. Since the inception of modern citizen parks, urban parks have been envisioned as public nature gardens offering spaces where individuals can connect with nature, indulge in leisure activities and foster familial bonds (Hwang, 2014; Sa, 2024). Even in contemporary society, parks persist as venues for "strolling" and "outing", and serve as everyday spaces for family engagement (Huang et al., 2022; Sreetheran, 2017). Terms such as "picnic", "bicycle", "scenery", and "tree" within park contexts serve to validate the enduring significance of rest, leisure and natural elements in these spaces, regardless of changing times, thereby enriching the quality of urban life (Lee and Son, 2021; Kim, 2023).

Beyond these park characteristics, the unique park elements and distinctive content/programs specific to each park enhance public awareness and diversify individual park experiences. For instance, Ilsan Lake Park focuses on the International Flower Fair and shapes park elements and content/programs accordingly. Bundang Yuldong Park has bungee jumping and library (book-themed park) facilities. Dongtan Lake Park has a clear group of park elements – a music fountain for the Luna Show. In contrast, Gwanggyo Lake Park, featuring fewer content/programs, is strategically positioned to foster daily leisure as a cultural facet of life in its proximity to residential areas. This strategic approach integrates various park elements with inherent natural elements, such as Woncheon and Shindae lakes, into the park's development plan (Kim et al., 2009).

Thus, a park's identity evolves through public perceptions and usage patterns, forming multiple layers influenced by its inherent nature, facilities, content and programs. A park's identity becomes profoundly ingrained in the public consciousness when it hosts distinctive programs while preserving its fundamental naturalistic characteristics and ensuring that it remains unique and recognizable in the future.

4.2 Effectiveness and Limitation of Utilization of Blog's Text Data

With the global proliferation of social media usage, extensive research on text-mining analysis is actively underway to comprehend user experiences and perceptions within this domain. This trend is primarily driven by enhanced information accessibility due to technological advancements, enabling a comprehensive exploration of public interest and perceptions (Park et al., 2022; Yang and Liu, 2022). The use of social media big data for text mining research in public spaces, including urban parks, enables the detection of user perceptions and usage patterns through user experience reviews (Huang et al., 2022; Kaußen, 2018; Munawir et al., 2019; Park et al., 2022; Song and Zhang, 2020). These user-generated narratives enhance the objectivity of the research regarding the compilation of user opinions when juxtaposed with traditional evaluation results obtained through conventional surveys (Bernabeu-Bautista et al., 2023; Choi et al., 2022; Koblet and Purves, 2020; Sim and Miller, 2019).

While social media text analysis is valuable for discerning trends, perceptions and behavioral shifts within extensive datasets, many studies simultaneously consider the geospatial context or land use of specific public spaces (Bernabeu-Bautista et al., 2023; García-Palomares et al., 2018). Understanding perceptions and user activities within a specific park context necessitates consideration of the park's physical environment. In particular, examining the characteristics of areas adjacent to parks is crucial for comprehending and interpreting people's perceptions and behavioral patterns evident in social media texts.

The text analysis result in this study, for example, shows that adjacent commercial facilities such as restaurants and shopping malls are privileged texts for Bundang Yuldong park and Dongtan lake park. This indicates that nearby commercial facilities would be one of the drivers of people using the park.

Therefore, although text mining offers the advantage of efficiently analyzing vast amounts of data using computer algorithms, understanding the geographical features and contextual elements surrounding a park's physical environment is essential. This contextual understanding enhances the accuracy of interpreting the revealed phenomena. A precise interpretation of these results can inform park planning and design and guide the creation of urban public spaces that support New Town park users' daily lives and leisure cultures.

5. Conclusions

This study focused on four representative parks in Phase 1 and 2 New Towns and encompassed deep learning-based Naver blog text analysis, finding visitors' activities and perceptions to derive insights into park and greenspace planning and to establish strategies for Phase 3 New Towns. This study aims to understand how people perceive and utilize these parks. The findings revealed that all four new town parks exhibited usage patterns oriented toward daily relaxation and leisure activities. These patterns attract diverse users, including residents and other groups. Furthermore, the uniqueness of each park was shaped not only by its facilities but also by its distinctive content and programs. The findings of this study provide valuable insights for planners, landscape architects and policymakers involved in the planning and development of parks and greenspaces in Phase 3 New Towns. Rather than designing parks as an afterthought once urban planning has been finalized, this study underscores the importance of integrating park development considerations into the initial stages of urban planning. Parks should be designed to offer unique content while preserving their natural characteristics.

The results of the present study have several important implications. First, it underscores the fact that the representatives of a park evolve through multi-layered processes involving people's perceptions, park usage patterns and the interplay between the park's inherent attributes and its elements, content and programs. Second, it emphasizes that a comprehensive approach to urban planning encompassing the park and its surrounding areas can extend the scope of how it is perceived and utilized. Such integrated planning can enhance awareness and usage of parks. Finally, besides text data analysis, this study discusses and underscores the potential value of incorporating analyses for physical spaces and broader social environments as complementary methods to aid more accurate interpretations of text data.

There are some limitations to this study. First, while it aimed to understand how people perceive and use these four parks as neighborhood parks, they attract not only local residents but also a significant number of transient visitors. This makes it challenging to consider the opinions exclusively representative of the residents. The study also suggests that park usage patterns vary based on the physical characteristics of the parks and the surrounding land use. However, it did not statistically examine the correlation between geospatial and text analysis results. Conducting these two analyses together would provide a more in-depth understanding of the usage patterns and user experiences in new town parks, leading to more accurate planning and design implications for Phase 3 New Towns.

References

1. Act on Urban Parks and Green Areas. (2016).
2. Bernabeu-Bautista, Á., L. Serrano-Estrada, and P. Martí(2023) The role of successful public spaces in historic centres. Insights from social media data. *Cities* 137: 104337. <https://doi.org/10.1016/j.cities.2023.104337>
3. Choi, C., J. Lee, J. Machado, and G. Kim(2022) Big-data-based text mining and social network analysis of landscape response to future environmental change. *Land* 11(12): 2183. <https://doi.org/10.3390/land11122183>
4. Choi, D. A., and W. J. Jeong(2014) A study of urban greenbelt prototypes and spatial characteristics of first generation metropolitan new towns - Focused on Il-san, Pyeong-chon and San-bon metropolitan

- new towns. *Journal of the Korean Institute of Landscape Architecture* 15(5): 107-123.
5. García-Palomares, J. C., M. H. Salas-Olmedo, B. Moya-Gómez, A. Condeço-Melhorado, and J. Gutiérrez(2018) City dynamics through Twitter: Relationships between land use and spatiotemporal demographics. *Cities* 72: 310-319. <https://doi.org/10.1016/j.cities.2017.09.007>
 6. Gu, H., K. Kim, and H. Jang(2021) Master-plan proposal for the Bucheon-Daejang district: Based on the evaluations of 1st- and 2nd-generation new towns in south Korea. *Journal of the Urban Design Institute of Korea Urban Design* 22(1): 5-24. <https://doi.org/10.38195/judik.2021.02.22.1.5>
 7. Huang, J. H., M. F. Floyd, L. G. Tateosian, and J. A. Hipp(2022) Exploring public values through Twitter data associated with urban parks pre- and post- COVID-19. *Landscape and Urban Planning* 227: 104517. <https://doi.org/10.1016/j.landurbplan.2022.104517>
 8. Hwang, J. H., and Y. J. Kim(2023) An evaluation of the master plan for 3rd generation new towns—focusing on Wangsuk, Gyosan, and Gyeongyang Districts -. *Journal of the Architectural Institute of Korea* 39(1): 157-168. <https://doi.org/10.5659/JAIK.2023.39.1.157>
 9. Hwang, J. Y.(2014) Urban Parks as Modern Invention of London and Paris in the Nineteenth Century. Ph. D. Dissertation, Seoul National University.
 10. KauBen, L.(2018) Landscape perception and construction in social media: An analysis of user-generated content. Wichmann Verlag. <https://doi.org/10.14627/537642040>
 11. Kim, D. K., H. S. Hong, and S. H. Moon(2009) Landscape design proposal for Gwanggyo Lakeside Park —focused on “Urban Reservoir”, the prizewinning work of international design competition. *Urban Design* 10(4): 53-66.
 12. Kim, H. S.(2007) Evaluation on the second phase new town development in SMA. *The Korean Regional Development Association* 19(4): 249-270.
 13. Kim, J. I., and S. J. Choi(2013) Investigation on planning tendency of green network system in Korean new towns in view of spatial configuration. *Journal of the Urban Design Institute of Korea Urban Design* 14(3): 145-159.
 14. Kim, S.(2023) A study on experiential space consumption patterns in urban parks through blog text analysis - Focusing on Ttukseom Hangang Park -. *Journal of the Korean Institute of Landscape Architecture* 49(4): 15-29.
 15. Koblet, O., and R. S. Purves(2020) From online texts to landscape character assessment: Collecting and analysing first-person landscape perception computationally. *Landscape and Urban Planning* 197: 103757. <https://doi.org/10.1016/j.landurbplan.2020.103757>
 16. Lee, J. K., and Y. H. Son(2021) Perception and appraisal of urban park users using text mining of Google maps review - Cases of Seoul forest, Boramae Park, Olympic Park -. *Journal of the Korean Institute of Landscape Architecture* 51(2): 68-80.
 17. Lee, J. K., and Y. H. Son(2022) Development of image classification model for urban park user activity using deep learning of social media photo posts. *Journal of the Korean Institute of Landscape Architecture* 50(6): 42-57.
 18. Munawir, M. D. Koerniawan, and B. J. Dewancker(2019) Visitor perceptions and effectiveness of place branding strategies in thematic parks in bandung city using text mining based on Google Maps User reviews. *Sustainability* 11(7): 2123. <https://doi.org/10.3390/su11072123>
 19. Park, S., S. Kim, J. Lee, and B. Heo(2022) Evolving norms: Social media data analysis on parks and greenspaces perception changes before and after the COVID 19 pandemic using a machine learning approach. *Scientific Reports* 12(1): 13246. <https://doi.org/10.1038/s41598-022-17077-3>
 20. Phase 2 New Town Development Details. (2017). MOLIT Policy Information. https://www.molit.go.kr/USR/policyData/m_34681/dtl?id=524
 21. Sa, G.(2024) A comparative study on the perception of urban Park along the Han River using text mining - Focusing on Seoul forest park, Seonyudo park, and Yeouido Park -. *Journal of the Korea Institute of Spatial Design* 19(3): 111-123.

22. Sim, J., and P. Miller(2019) Understanding an urban park through big data. *International Journal of Environmental Research and Public Health* 16(20): 3816. <https://doi.org/10.3390/ijerph16203816>
23. Song, E. H., and K. M. Kim(2019) Construction of housing price index for second-generation new towns and nearby areas in Seoul metropolitan area. *Journal of Real Estate Analysis* 5(2): 17-41. <https://doi.org/10.30902/jrea.2019.5.2.17>
24. Song, Y., and B. Zhang(2020) Using social media data in understanding site-scale landscape architecture design: Taking Seattle Freeway Park as an example. *Landscape Research* 45(5): 627-648. <https://doi.org/10.1080/01426397.2020.1736994>
25. Sreetheran, M. (2017) Exploring the urban park use, preference and behaviours among the residents of Kuala Lumpur, Malaysia. *Urban Forestry & Urban Greening* 25: 85-93. <https://doi.org/10.1016/j.ufug.2017.05.003>
26. Woo, K. S., and J. H. Suh(2018) Time series analysis of park use behavior utilizing big data - Targeting Olympic Park -. *Journal of the Korean Institute of Landscape Architecture* 46(2): 27-36.
27. Yang, C., and T. Liu(2022) Social media data in urban design and landscape research: A comprehensive literature review. *Land* 11(10): 1796. <https://doi.org/10.3390/land11101796>
28. Yoon, J. J.(2019) A study on the direction of the third phase new town development in Seoul metropolitan area through expert survey method. *LHI Journal of Land, Housing, and Urban Affairs* 10(3): 43-55. <https://doi.org/10.5804/LHIJ.2019.10.3.043>
29. Yoon, J. J., S. H. Choi, D. S. Choi, J. R. Yoon, K. N. Chin, O. J. Kwon, and T. H. Song(2021) The Comprehensive Assessment for the Phase 1 and 2 New Towns in Korea Volume 1. LHI.
30. Yoon, J. J., D. H. Kim, E. J. Yoon, J. R. Yoon, O. J. Kwon, T. Song, S. Park, D. Kim, and S. H. Choi(2020) A Study on the Phase 3 New Town Development Strategies and Planning Guidelines. LHI.
31. Cho, J. M.(n.d.) New Town Development of Korea. National Archives of Korea. Retrieved August 15, 2023, from <https://theme.archives.go.kr/next/koreaOfRecord/newTown.do>