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The Spatial Dynamics of Cafés as Everyday Urban Spaces : Exploring Socialscapes through Streetscapes

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The Spatial Dynamics of Cafés as Everyday Urban Spaces: Exploring Socialscapes through Streetscapes

I. Introduction

Background

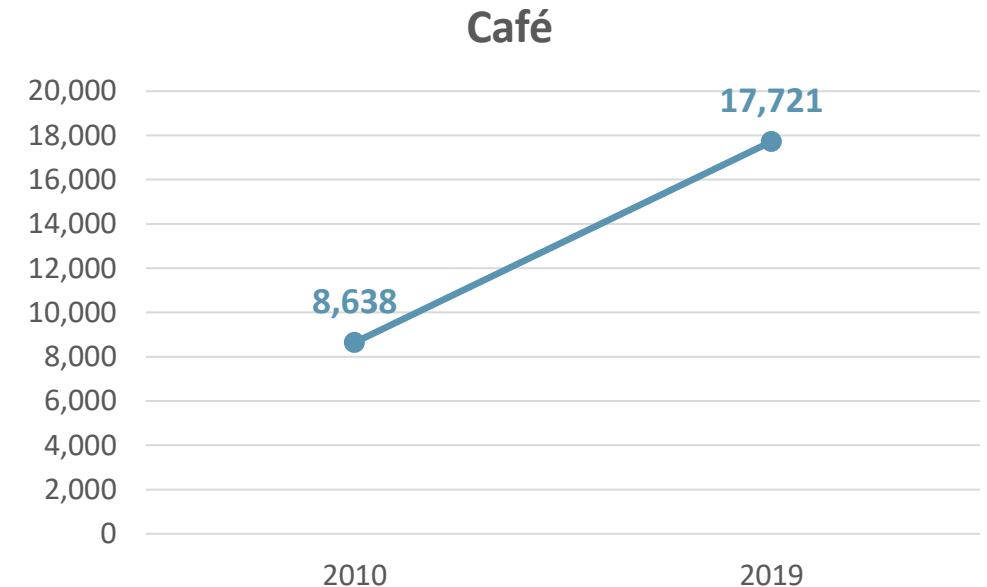
- Modern consumer culture has shifted from purchasing products to experiencing places.
- Alongside this shift, location-based information disseminated through social media facilitates indirect engagement with place (Yuksel et al., 2016), thereby reshaping spatial preferences.
- As a result, cafés and previously overlooked areas have started to gain attention from consumers.



I. Introduction

Background

- In South Korea, cafés have increasingly made location decisions in favour of residential neighbourhoods with relatively lower rents, facilitated by improved access to location-based information.
- Between 2010 and 2019, the number of cafés in Seoul doubled, leading the formation of new commercial spaces within the city through rapid proliferation and high locational flexibility.
- Cafés have evolved into everyday social spaces that enrich public life and reflect personal identity through spatial experience.
- Their location decisions are increasingly influenced by the perceptual and physical qualities of surrounding streetscapes, which shape how pedestrians experience and evaluate place.
- Such streetscape elements play a critical role in enhancing the spatial attractiveness of café locations.



I. Introduction

Research Gap

- Traditional retail location theories and previous studies emphasize accessibility, land price, and agglomeration.
- These models cannot fully explain recent café openings in alleyways and less accessible areas.
- New cafés are emerging in small-scale, locally situated spaces that offer sensory and experiential appeal.
- Consumers are increasingly drawn to places that feel unique, not just those that are physically accessible.
- Accordingly, examining the influence of streetscape and walkability on café location decisions is essential to understanding the evolving dynamics of urban retail geography.



Research Objective

- To fill this gap, this study examines the spatial dynamics of café location shifts in an area where traditional and emerging retail districts coexist, and analyses the influence of **streetscape** and **walkability**.
- Furthermore, it aims to assess the limitations of traditional theories in explaining café location decisions and to explore the evolving role of cafés in urban space.

II. Literature Review

Central-place theory (Christaller, 1933)	Retail stores are assumed to be regularly distributed to minimise travel distance for consumers, with hierarchical central places offering different levels of goods and services.
Central-place theory (Lösch, 1938)	Location decisions are driven by retailers' pursuit of profit maximisation, often resulting in relocation to peripheral areas in response to market competition.
Movement-economic theory (Hillier, 1997)	Retail location patterns can be explained through the relationship between urban structure and movement, as street networks generate flows that attract commercial activity.
Rent gap theory (Smith, 1979)	Commercialisation tends to occur where rent gaps emerge, as lower land values attract retailers even in areas with comparable accessibility.
Consumption-based theory (Ley, 1997)	When artists move into low-rent areas, they foster a consumption culture centred on aesthetic value.
Servicescape (Bitner, 1992)	The servicescape includes both the interior and exterior of a facility, as well as its surroundings, allowing consumers to indirectly perceive service quality and product value, even prior to direct service engagement.

II. Literature Review

- Traditional retail location theories assume that retailers make location decisions that **minimise transportation costs** for consumers while maximising proximity to both competing and complementary stores.
- Today, retail locations are increasingly chosen by consumers based not only on convenience but also on the unique characteristics of a district and the physical environment and atmosphere surrounding the store.
- Walkable streets provide positive sensory stimuli, contributing to more enjoyable and satisfying service experiences (Koo et al., 2023).

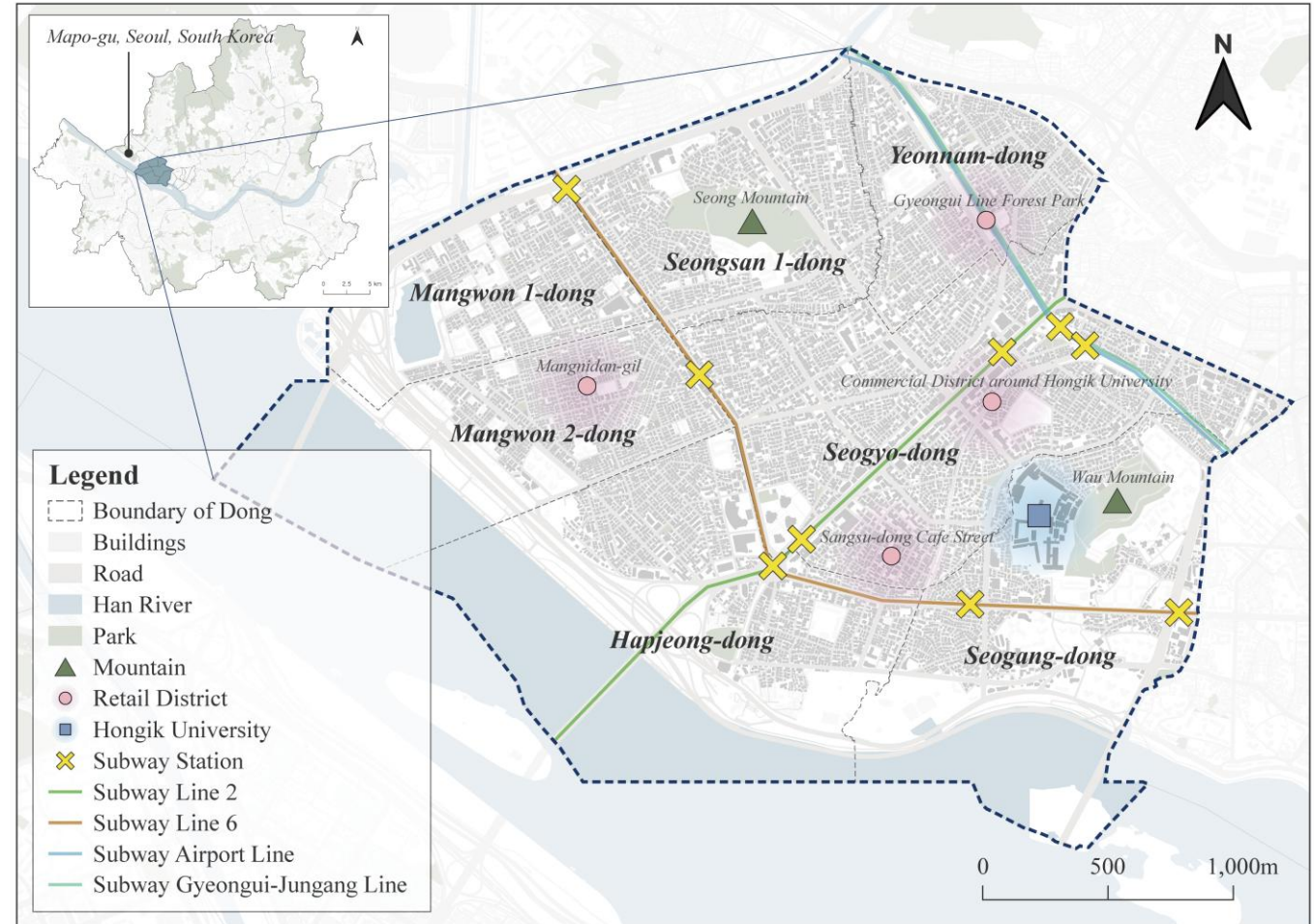


By analysing new patterns in café locations, this study contributes to understanding not only the spatial transformation of retail districts and urban form, but also the **socio-cultural shifts driven by experiential consumption**.

III. Methodology

Study Area

- **Hongdae retail district**
 - Area : 8.15 km²
 - 7 administrative districts (dong)
 - One of the major commercial centres in Seoul
 - 6 subway stations along 4 lines
 - Human-scale streetscapes
 - Mixture of residential and commercial zones

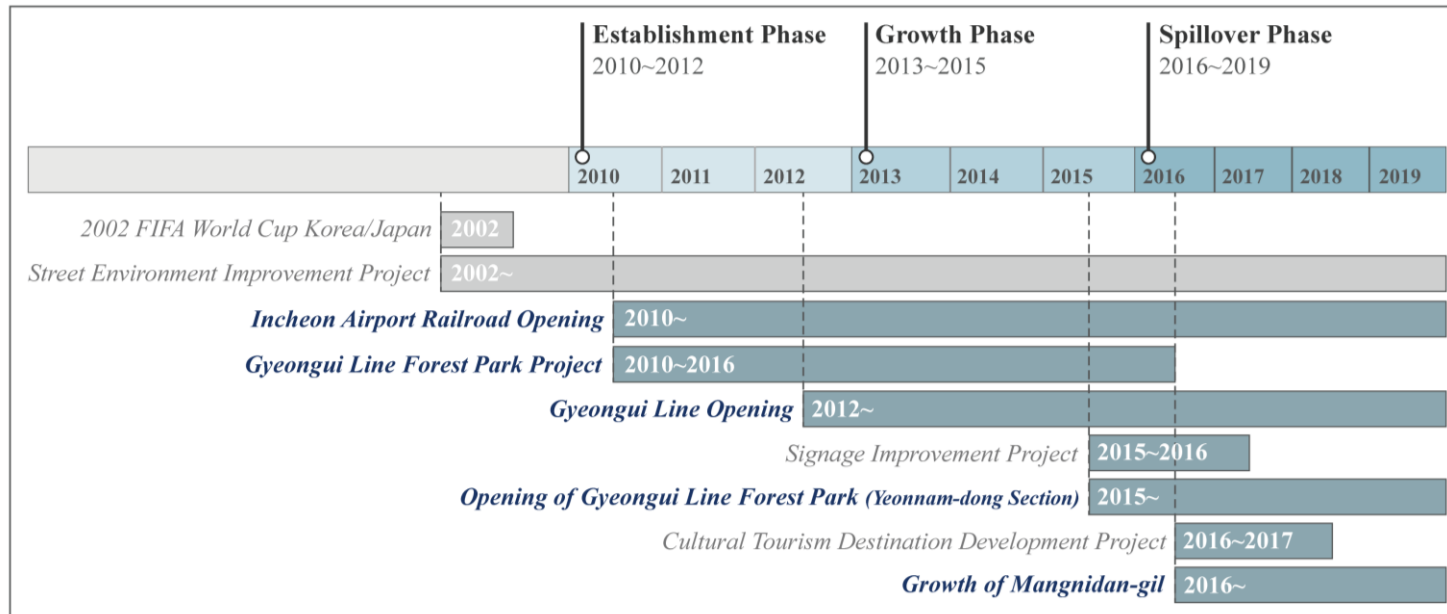


*The term 'Hongdae' refers to the area surrounding Hongik University, which has developed into a retail centre around the campus.

III. Methodology

Definition of Analysis Periods

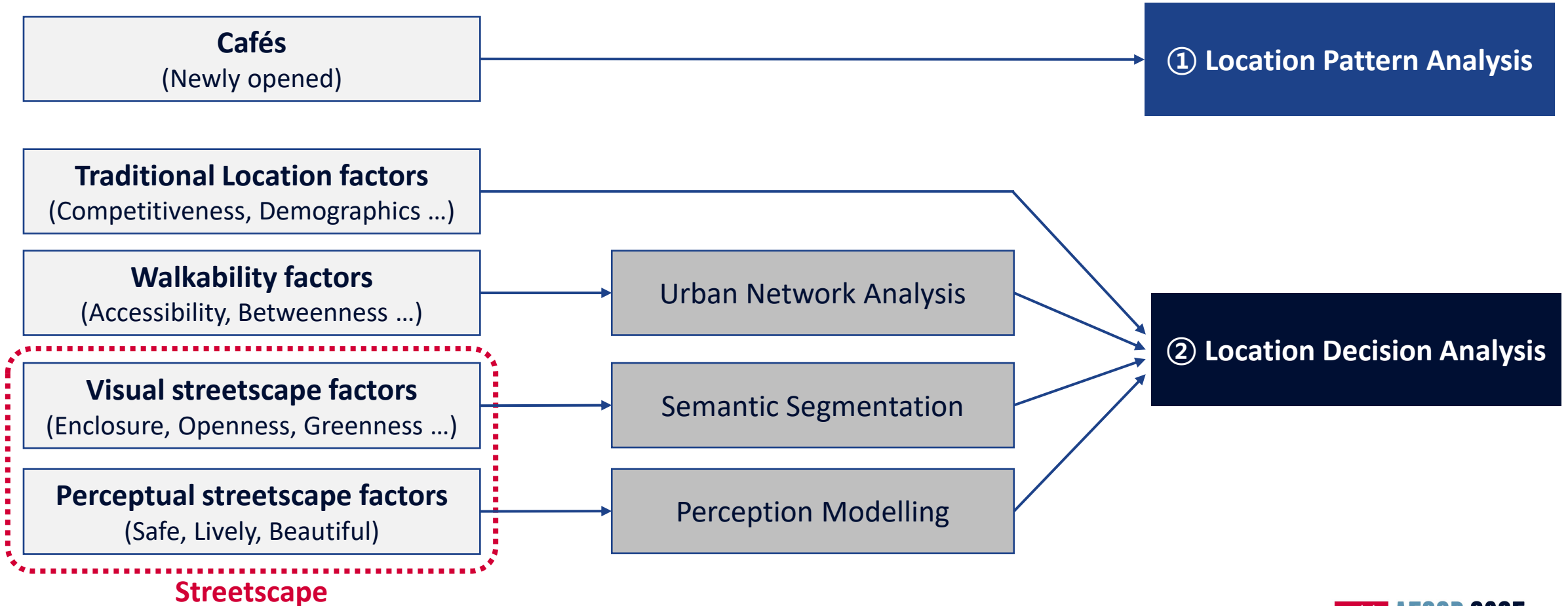
- Based on the evolution of the Hongdae retail district, the study defines three distinct analytical phases.
 - Establishment Phase (2010–2012)** : Initial café clustering near Hongik University
 - Growth Phase (2013–2015)** : Spatial expansion from the commercial centre into surrounding areas
 - Spillover Phase (2016–2019)** : Diffusion into alleyways beyond major boulevards



- The Hongdae began to take shape in 1955 with the establishment of the College of Fine Arts at Hongik University and gradually evolved into a culturally significant street.
- In 2012, the opening of new subway line (Gyeongui–Jungang Line) improved accessibility from other cities.
- In 2015, the ‘Gyeongui Line Forest Park’ was completed and the ‘Beautiful Signage Street Project’ was implemented.

III. Methodology

Research Framework

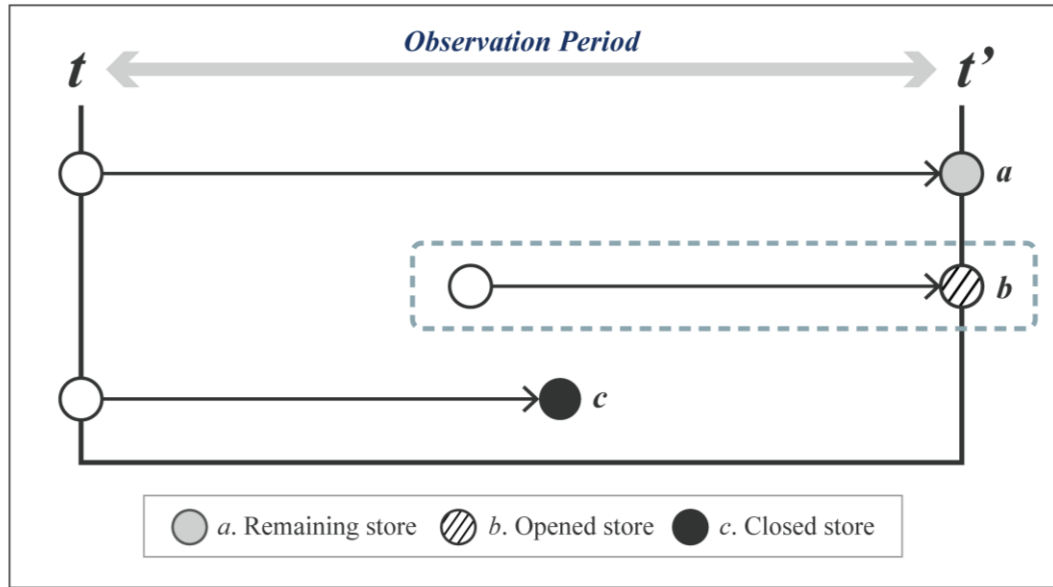


III. Methodology

Variable

Dependent Variable

- Binary variable (SGIS)
 - Newly opened (2010–2019)
 - Café (KSSC 56221, 56229)



Independent Variable

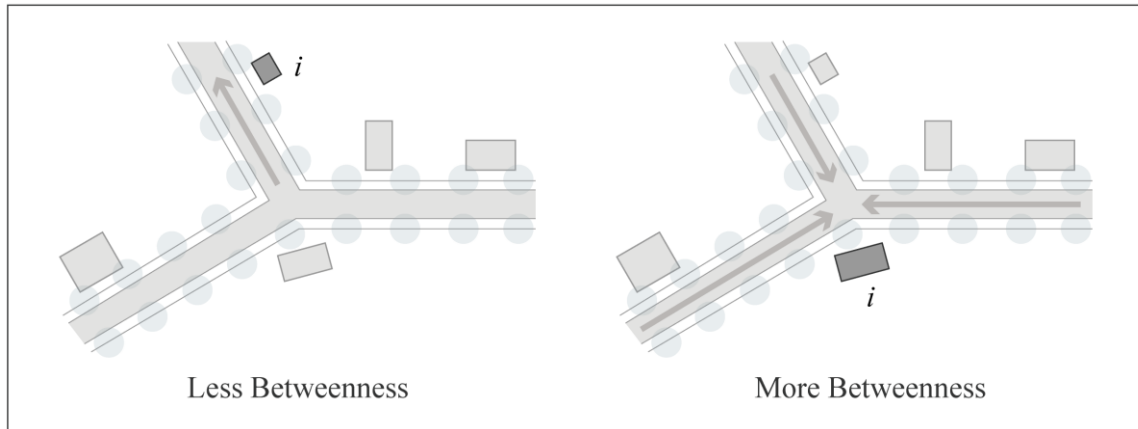
- Walkability characteristics (MOLIT)
 - Subway accessibility
 - Park accessibility
 - Betweenness
 - Road width
- Streetscape characteristics (NSV)
 - Visual attributes
 - Perceptual attributes
- Control variables
 - Competitiveness (SGIS)
 - Built environments (MOLIT, SODP)
 - Demographics (SGIS)

*Store opening was operationally defined as the appearance of a café in year t that did not exist in year $t-1$.

III. Methodology

Variable

- Urban Network Analysis (UNA)
 - Network-based spatial analysis method
 - Street network data from 2019
 - We were implemented using Rhinoceros 3D.



Example of betweenness (Adapted from Sevtsuk, 2014)

Walkability Characteristics

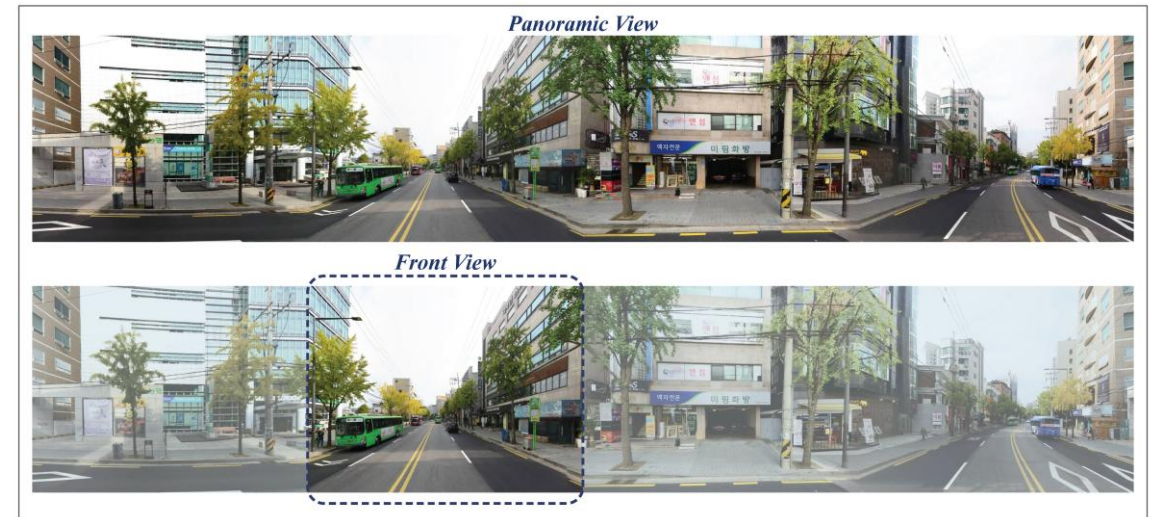
- Gravity Index
 - Network radius = 600m
 - Distance decay 0.00217 (Handy & Niemeier, 1997)
 - Proximity to subway station exits and parks
 - $Gravity[i]^r = \sum_{j \in G-i; d[i,j] \leq r} W[j]^\alpha / e^{\beta * d[i,j]}$
- Betweenness
 - Full network of buildings
 - Weighted by volume
 - Proxy for estimating pedestrian flow
 - $Betweenness[i]^{r,dr} = \sum_{j,k \in G-i; d[j,k] \leq r * dr} (n_{jk}[i] / n_{jk}) W[j]$

*Given that urban structures such as roads and buildings tend to evolve gradually over long periods (Casali & Heinemann, 2019), it was assumed that the spatial configuration remained relatively stable during the analysis period.

III. Methodology

Variable

- Naver Street View (NSV) panoramic 360° images
 - Generating points at 20 metre intervals along the street network in Hongdae retail district
 - Visual attributes, **full panoramic images** were used to assess the overall street environment.
 - Perceptual attributes, **only the front-facing portions of the panoramic images** were extracted, as these reflect the visual field most relevant to pedestrians and were used as input for streetscape perception modelling.
- Total of 21,101 panoramic images in 2010, 2014–2015, and 2016–2017 by phases
 - NSV data for 2013 were not available, as imagery for that year was not provided by the platform.
 - 2015 and 2017 images were included to supplement spatial gaps left by incomplete coverage in earlier years.



III. Methodology

Variable

Streetscape - Visual Attributes

- Calculated by deep learning model (HRNet) which is trained with ADE20K semantic segmentation dataset
- Enclosure, Openness, Pavement, Greenness

Streetscape – Perceptual Attributes

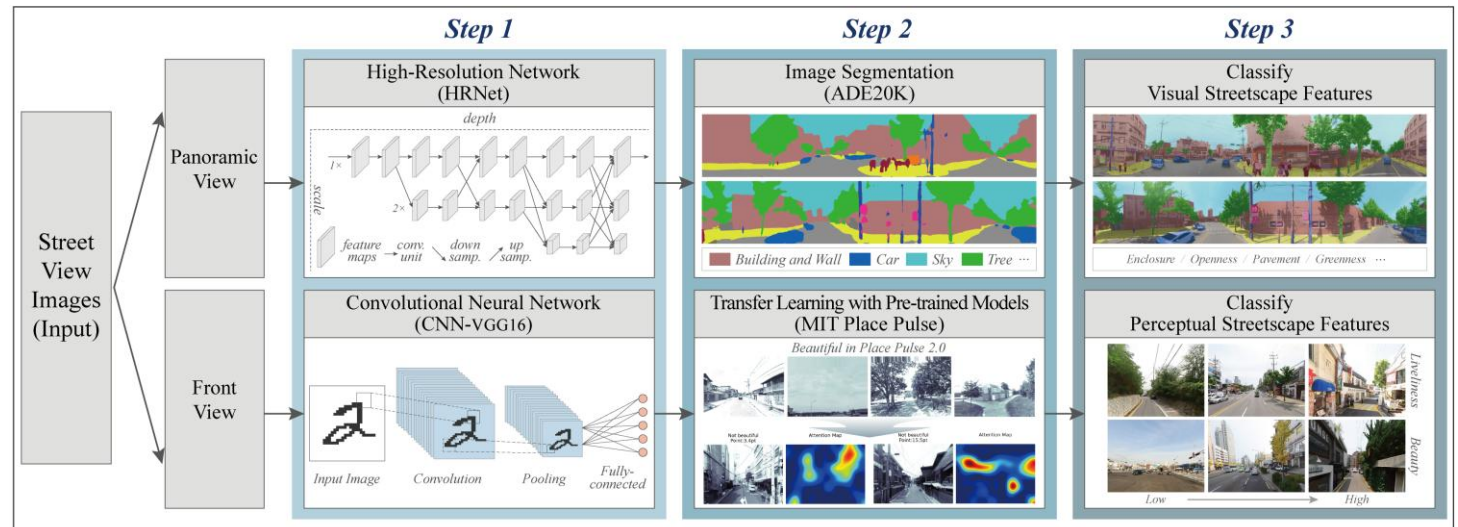
- Estimated by CNN-based deep learning model (VGG16) which is trained with MIT Place Pulse dataset
- Safe, Lively, Beautiful

$$\text{Enclosure} = \frac{\text{building pixels} + \text{wall pixels}}{\text{road pixels}}$$

$$\text{Openness} = \frac{\text{sky pixels}}{\text{total pixels}}$$

$$\text{Pavement} = \frac{\text{sidewalk pixels}}{\text{road pixels}}$$

$$\text{Greenness} = \frac{\text{tree pixels} + \text{grass pixels} + \text{plant pixels}}{\text{total pixels}}$$



*From the Place Pulse dataset, we extracted three positive perceptual dimensions—Safe, Lively, and Beautiful—as quantifiable street scores for each image. Other perceptual labels were excluded to ensure objectivity and reliability.

III. Methodology

Variable

Variable		Description of variables		Source
Independent variable	Walkability characteristics	Open	Binary variable indicating whether a café newly opened (1=Yes; 0=No)	SGIS
		Subway	Spatial accessibility to subway entrance in the radius (gravity, r=600m)	MOLIT
		Park	Spatial accessibility to park in the radius (gravity, r=600m)	
		Betweenness	Connectivity between all buildings in the radius (r=n, weighted by volume)	
		Road width	Width of the road adjacent to the building (m)	
	Streetscape characteristics	Visual attributes	Enclosure	NSV
			Openness	
			Pavement	
			Greenness	
		Perceptual attributes	Safe	
			Lively	
			Beautiful	
Control variable	Competitive characteristics	Occupied	Binary variable indicating whether the café was already occupied in the previous year (1=Yes; 0=No)	SGIS
		Agglomeration	Spatial proximity to other operating cafés in the radius (gravity, r=100m)	
	Built environment characteristics	Building footprint	Footprint area of the building (m ²)	MOLIT
		Building height	Height of the building (m ²)	
		Parcel area	Area of the land parcel (m ²)	
		Land price	Average land price during the analysis period (won)	
	Demographic characteristics	Residents	Residential population density in the census district	SGIS
		Millennials	Number of millennials (aged 20–39) in the census district	
		Employees	Number of workers in the census district	

III. Methodology

Research Methods

- Kernel density estimation (KDE)
 - Point pattern analysis method
 - Non-parametric technique that estimates the probability density of point distributions
 - Effective for spatial **visualisation** clusters of point features
- Binary logistic regression
 - One of the simplest probabilistic modelling techniques
 - Accommodate **non-linear** relationships
 - Estimate the **probability** of event's occurrence
 - $\text{logit } P = \ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 x_1 + \dots + \beta_n x_n \ (n = 1, 2, 3 \dots)$
($\frac{p}{1-p}$: odds, β_n : coefficient, x_n : independent variables)
 - If β_n is negative, OR < 1, indicating that an increase in x_n decreases the odds.



Location Pattern
Analysis

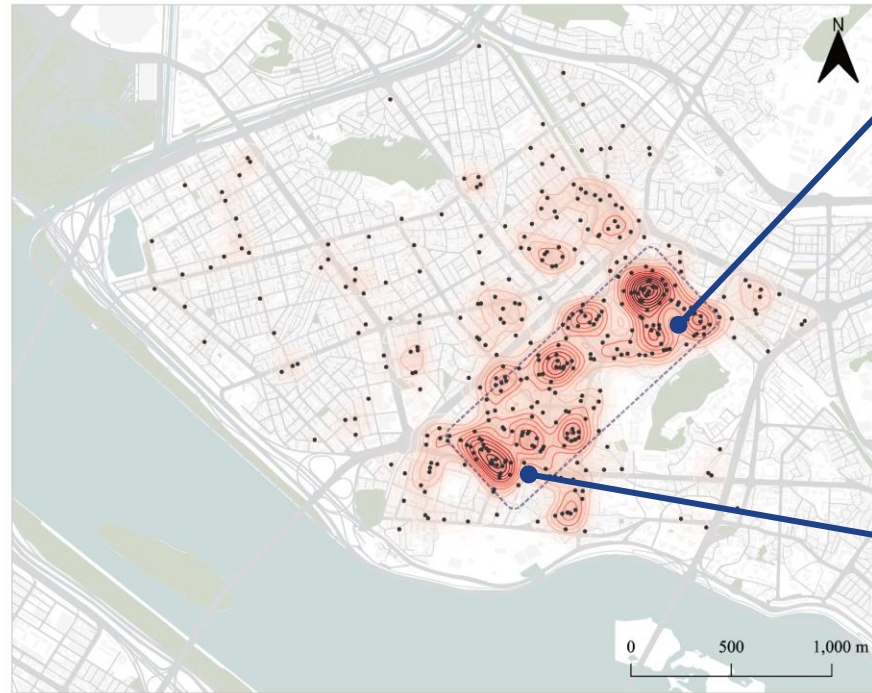
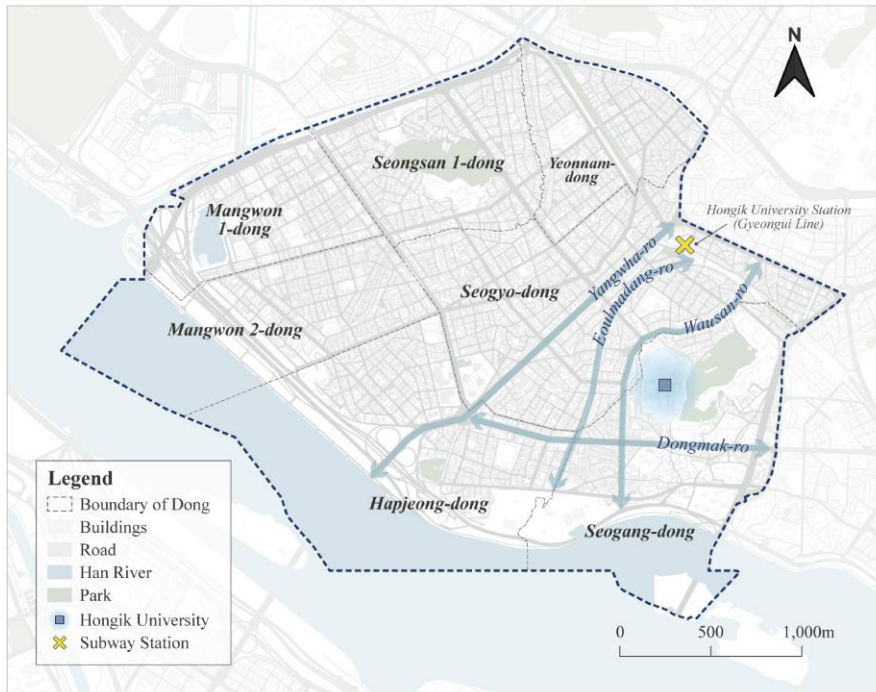


Location Decision
Analysis

IV. Results

Location Patterns in Establishment Phase

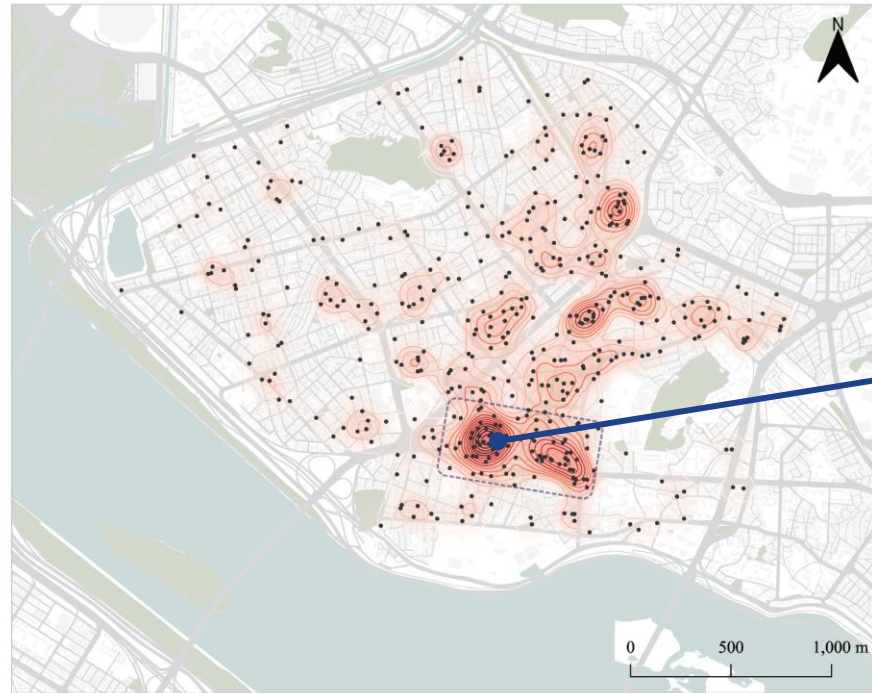
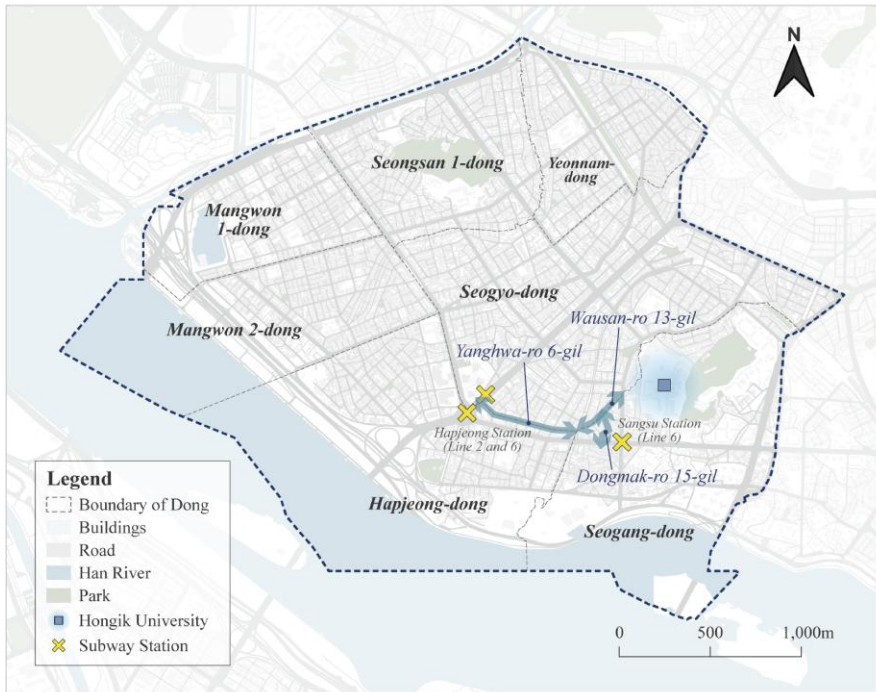
- Concentration within the established commercial centre
 - Around Hongik University and Hongdae station
 - Clustered High street and boulevards (Yanghwa-ro, Dongmak-ro ...)



IV. Results

Location Patterns in Growth Phase

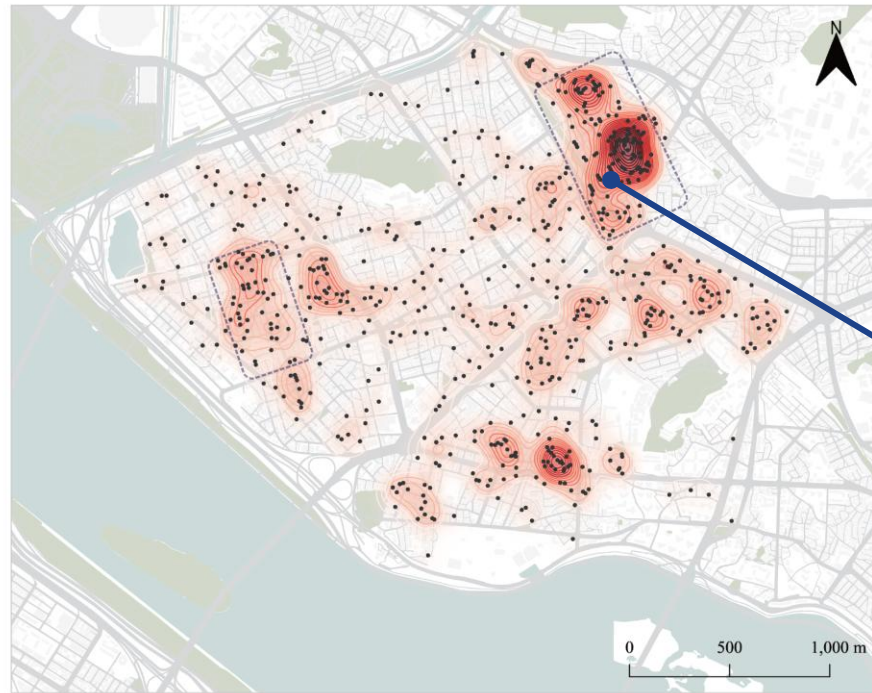
- Expansion into side streets adjacent to major boulevards
 - Around Hapjeong station and Sangsu station
 - Located roughly one block away from major boulevards (Yangwha-ro 6-gil, Dongmak-ro 15-gil ...)



IV. Results

Location Patterns in Spillover Phase

- Diffusion into alleyways deeper within residential area
 - Around Gyeongui Line Forest Park
 - Extended beyond boulevards and into inner-block alleyways (Donggyo-ro, Donggyo-ro 29-gil, Yangwha-ro 23-gil ...)



IV. Results

Descriptive Statistics

Variables	Model 1		Model 2		Model 3		Obs
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Open	0.03	0.17	0.03	0.18	0.05	0.22	13,439
Subway (gravity, 600m)	0.93	1.08	1.13	1.25	1.13	1.25	
Park (gravity, 600m)	1.14	0.47	1.14	0.47	1.14	0.47	
Betweenness (weight=building volume, r=n, log)	11.97	1.16	11.97	1.16	11.97	1.16	
Road width	6.06	4.46	6.06	4.46	6.06	4.46	
Enclosure (r=100m)	838.96	564.68	742.79	287.71	835.18	299.62	
Openness (r=100m)	17.99	3.97	16.10	3.49	15.28	3.32	
Pavement (r=100m)	26.00	24.45	25.43	8.54	26.05	8.35	
Greenness (r=100m)	7.19	4.43	10.23	5.31	9.80	4.94	
Safe (r=100m)	0.26	0.09	0.40	0.11	0.38	0.09	
Lively (r=100m)	0.74	0.10	0.80	0.08	0.81	0.07	
Beautiful (r=100m)	0.16	0.07	0.23	0.09	0.22	0.08	
Occupied	0.03	0.16	0.05	0.21	0.06	0.24	
Agglomeration (gravity, r=100m)	0.87	1.78	1.42	2.29	1.88	2.37	
Building footprint (log)	4.69	0.55	4.69	0.55	4.69	0.55	
Building height (log)	2.43	0.55	2.43	0.55	2.43	0.55	
Parcel area	14.84	0.36	15.00	0.37	15.37	0.36	
Land price (log)	269.86	601.76	269.86	601.76	269.86	601.76	
Residents	11.06	0.72	10.97	0.76	10.94	0.79	
Millennials	71.33	46.58	58.27	25.31	60.21	27.88	
Employees	6.26	1.78	6.34	1.81	6.60	1.70	

*Note: Model 1 corresponds to the Establishment Phase, Model 2 to the Growth Phase, and Model 3 to the Spillover Phase.

IV. Results

Café Location (Model 1)

- **Newly opened café in the Establishment Phase**
 - Cafés tend to locate on less lively streets (lower liveliness)
 - Prefer occupied buildings, agglomerated areas, and locations with higher land prices
 - Favour compact building forms (small footprint, taller height)
 - More likely to appear in areas with larger resident populations, millennials, and employees

Variables	Model 1 (Establishment Phase)		
	OR	z	VIF
Constant	4.40e-11***	-7.85	-
<i>Dependent variables</i>			
<i>Walkability characteristics</i>			
Subway (gravity, r=600m)	1.09	1.64	1.39
Park (gravity, r=600m)	1.24	1.59	1.12
Betweenness (weight=building volume, r=n, log)	1.02	0.42	1.33
Road width	1.01	1.22	1.27
<i>Streetscape characteristics</i>			
<i>Visual attributes</i>			
Enclosure (r=100m)	0.99	-0.69	5.49
Openness (r=100m)	1.00	0.21	1.63
Pavement (r=100m)	1.00	0.28	4.48
Greenness (r=100m)	0.99	-0.00	3.47
<i>Perceptual attributes</i>			
Safe (r=100m)	4.24	1.12	3.67
Lively (r=100m)	0.18*	-1.77	2.59
Beautiful (r=100m)	0.13	-1.12	4.41
<i>Control variables</i>			
<i>Store characteristics</i>			
Occupied	9.49***	15.48	1.14
Agglomeration (gravity, r=100m)	1.13***	5.33	1.61
<i>Built environment characteristics</i>			
Building footprint (log)	0.79**	-2.11	1.46
Building height (log)	1.38***	2.73	1.31
Parcel area	1.00**	2.17	1.27
Land price (log)	2.72***	6.17	1.88
<i>Demographic characteristics</i>			
Residents (log)	1.44***	2.89	1.86
Millennials	1.00***	2.73	1.41
Employees (log)	1.21***	2.99	2.24
Number of obs.		13,439	
Log likelihood		-1,405.53	
LR chi²(df)		746.58 (20)***	
Nagelkerke R²		0.23	
AIC		2,853.05	
BIC		3,010.68	

*: p<0.1, **: p<0.05, ***: p<0.01

*R² values in logistic regression tend to be relatively low and vary depending on the distribution of the dependent variable (Cohen et al., 2009).

IV. Results

Café Location (Model 2)

- **Newly opened café in the Growth Phase**
 - Cafés tend to locate on aesthetic streets (higher beauty, lower liveliness)
 - Prefer walkable environments (wider pavements, higher enclosure)
 - Prefer accessible locations (subway stations, parks)
 - Favour occupied buildings, agglomerated areas, and sites with higher land prices
 - More likely to appear in areas with taller buildings, more residents, and more employees

Variables	Model 2 (Growth Phase)		
	OR	z	VIF
Constant	1.22e-09***	-6.40	-
<i>Dependent variables</i>			
<i>Walkability characteristics</i>			
Subway (gravity, r=600m)	1.11**	2.59	1.59
Park (gravity, r=600m)	1.27**	2.06	1.10
Betweenness (weight=building volume, r=n, log)	0.95	-1.01	1.32
Road width	0.99	-0.68	1.27
<i>Streetscape characteristics</i>			
<i>Visual attributes</i>			
Enclosure (r=100m)	0.99**	-2.10	3.35
Openness (r=100m)	0.99	-0.38	1.75
Pavement (r=100m)	1.02**	2.45	1.68
Greenness (r=100m)	0.95*	-1.96	4.62
<i>Perceptual attributes</i>			
Safe (r=100m)	0.86	-0.12	7.01
Lively (r=100m)	0.13*	-1.79	3.04
Beautiful (r=100m)	9.89*	1.69	6.16
<i>Control variables</i>			
<i>Store characteristics</i>			
Occupied	4.64***	11.74	1.16
Agglomeration (gravity, r=100m)	1.05***	2.76	1.72
<i>Built environment characteristics</i>			
Building footprint (log)	0.97	-0.30	1.47
Building height (log)	1.48***	3.69	1.31
Parcel area	0.99	-0.71	1.17
Land price (log)	2.17***	4.79	2.18
<i>Demographic characteristics</i>			
Residents (log)	1.45***	3.13	2.09
Millennials	1.00	1.59	1.16
Employees (log)	1.31***	4.38	2.39
Number of obs.		13,439	
Log likelihood		-1,741.58	
LR chi ² (df)		538.98 (20)***	
Nagelkerke R ²		0.15	
AIC		3,525.15	
BIC		3,682.78	

*: p<0.1, **: p<0.05, ***: p<0.01

*R² values in logistic regression tend to be relatively low and vary depending on the distribution of the dependent variable (Cohen et al., 2009).

IV. Results

Café Location (Model 3)

- **Newly opened café in Spillover Phase**
 - Cafés tend to locate on lively streets (higher liveliness)
 - Prefer environments with high pedestrian activity and high street vitality (higher enclosure, higher openness, narrower pavements)
 - Less preference for accessible locations (subway stations)
 - Favour occupied buildings, agglomerated areas, and sites with higher land prices
 - More likely to appear in areas with taller buildings, more residents, and more employees

Variables	Model 3 (Spillover Phase)		
	OR	z	VIF
Constant	1.25e-09***	-6.73	-
<i>Dependent variables</i>			
<i>Walkability characteristics</i>			
Subway (gravity, r=600m)	0.89***	-2.88	1.57
Park (gravity, r=600m)	1.17*	1.73	1.08
Betweenness (weight=building volume, r=n, log)	0.99	-0.10	1.33
Road width	0.98*	-1.91	1.27
<i>Streetscape characteristics</i>			
<i>Visual attributes</i>			
Enclosure (r=100m)	1.00***	4.89	3.21
Openness (r=100m)	1.09***	5.78	1.67
Pavement (r=100m)	0.98**	-1.97	2.08
Greenness (r=100m)	1.01	0.79	5.56
<i>Perceptual attributes</i>			
Safe (r=100m)	0.42	-0.79	5.51
Lively (r=100m)	14.15**	2.42	3.25
Beautiful (r=100m)	2.89	0.77	7.42
<i>Control variables</i>			
<i>Store characteristics</i>			
Occupied	6.10***	16.60	1.13
Agglomeration (gravity, r=100m)	1.06***	3.49	1.76
<i>Built environment characteristics</i>			
Building footprint (log)	0.89	3.37	1.47
Building height (log)	1.30***	-0.92	1.32
Parcel area	0.99	-1.28	1.16
Land price (log)	1.73***	2.96	2.42
<i>Demographic characteristics</i>			
Residents (log)	1.38***	3.17	1.98
Millennials	1.00	0.53	1.23
Employees (log)	1.14***	2.73	2.53
Number of obs.		13,439	
Log likelihood		-2,413.44	
LR chi²(df)		491.43 (20)***	
Nagelkerke R²		0.11	
AIC		4,868.88	
BIC		5,026.50	

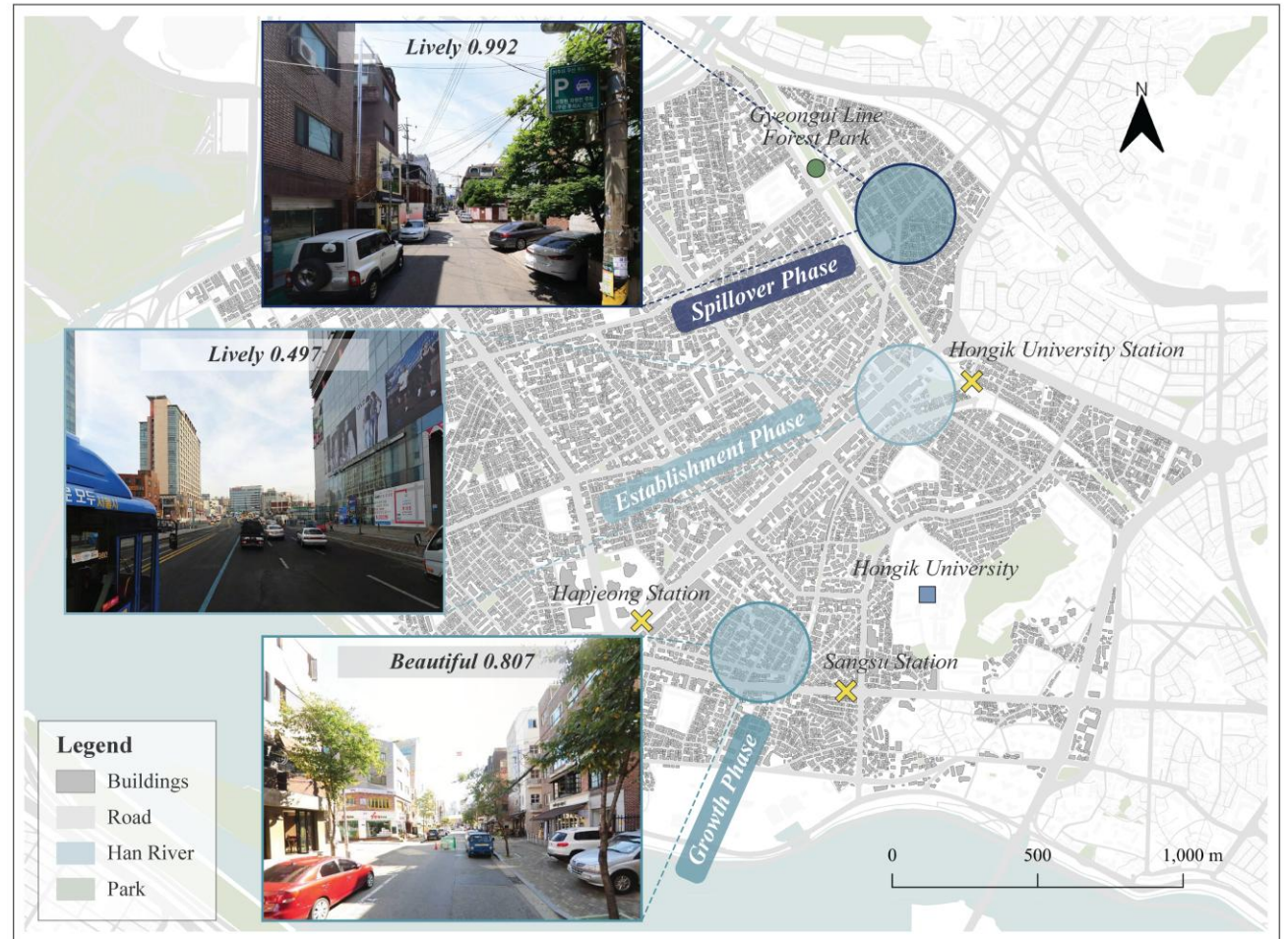
*: p<0.1, **: p<0.05, ***: p<0.01

*R² values in logistic regression tend to be relatively low and vary depending on the distribution of the dependent variable (Cohen et al., 2009).

IV. Results

Discussion

- Café location shifts reflect evolves in consumer culture and the influence of streetscape and place perception.
- As commercial centres become saturated, cafés shift toward adjacent areas such as alleyways with lower rents—consistent with previous studies on retail expansion (Ley, 1997; Smith, 1979; Zukin, 1987).
- This highlights the growing importance of spatial features shaped by **consumer experience** in café location decisions.



IV. Results

Discussion

- In Growth Phase, cafés concentrated near subway stations and parks. It reflects continued preference for central areas with high transit accessibility and public amenities.
 - Supports prior studies emphasising the role of public transit as an anchor for pedestrian flow and retail activity (Lee & Kwon, 2015; Wu et al., 2021; Yoshimura et al., 2021)
 - Highlights how parks attract consumers and generate synergies with surrounding businesses (Sim, 2019)
- In Spillover Phase, cafés preferred locations with subway accessibility and narrower street widths. It Indicates a shift away from minimising distance to a fixed destination or prioritising highly walkable central locations.



The relationship between café locations and walkability differs across phases. Café location decisions shift from a focus on **transit-based accessibility** to a preference for **human-scale spaces**.

IV. Results

Discussion

- The visual and perceptual quality of streetscapes plays an important role in shaping café location decisions, and this influence differs by phase.
 - This shift in location—from closed boulevards with limited social interaction to open alleyways that support informal encounters—ultimately contributes to **neighbourhood transformation** and strengthens the **vitality of the broader urban space**.
- Vibrant and visually appealing streetscapes invite pedestrians, encouraging **optional activities** (Gehl & Svarre, 2014).
 - Cafés clustered along pedestrian-friendly and aesthetically pleasing streets, the resulting streetscapes can promote gradual urban growth and enhanced vibrancy (Cox & Streeter, 2019; Jacobs, 1961; Kickert & Talen, 2022).
 - Outdoor cafés that utilise terraces in highly walkable areas, or shops embedded in alleyways that foster active interaction with the street, serve as extensions of public space (Montgomery, 1997; Sim, 2019).
 - Urban planners should enhance streetscapes and encourage **small-scale commercial activity** in alley-based retail districts.

V. Conclusion

Summary

- Café location decisions are shaped by the interaction between urban spatial conditions and consumer preferences.
- The importance of location factors has shifted over time.
 - Accessibility in the Establishment Phase
 - Walkability in the Growth Phase
 - Visual and perceptual streetscape qualities in the Spillover Phase
- In contemporary urban life, cafés have become key social spaces that support everyday life (Horton & Kraftl, 2013), while streetscapes serve as a medium for memory, experience, and emotional resonance.

Implications

- This study re-evaluates the continued relevance of traditional location theories by demonstrating their limitations in explaining the shifting patterns of café locations. It highlights the overlooked connection between café location shifts and streetscape characteristics, emphasising the role of **visual and perceptual qualities in shaping retail dynamics**.
- These insights extend beyond locational shifts to highlight how cafés, as everyday social spaces, contribute to **lived experience, sense of place, and urban vibrancy**.

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Thank you!

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