

Experiences in Using AI for Destination Management and Intelligence

Measuring crowdedness and tourism vitalization with data and AI

Insights from the Korea Tourism Data Lab and beyond

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Tourism Consulting Team
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Development of the Tourism Vitalization Index

Chapter 01

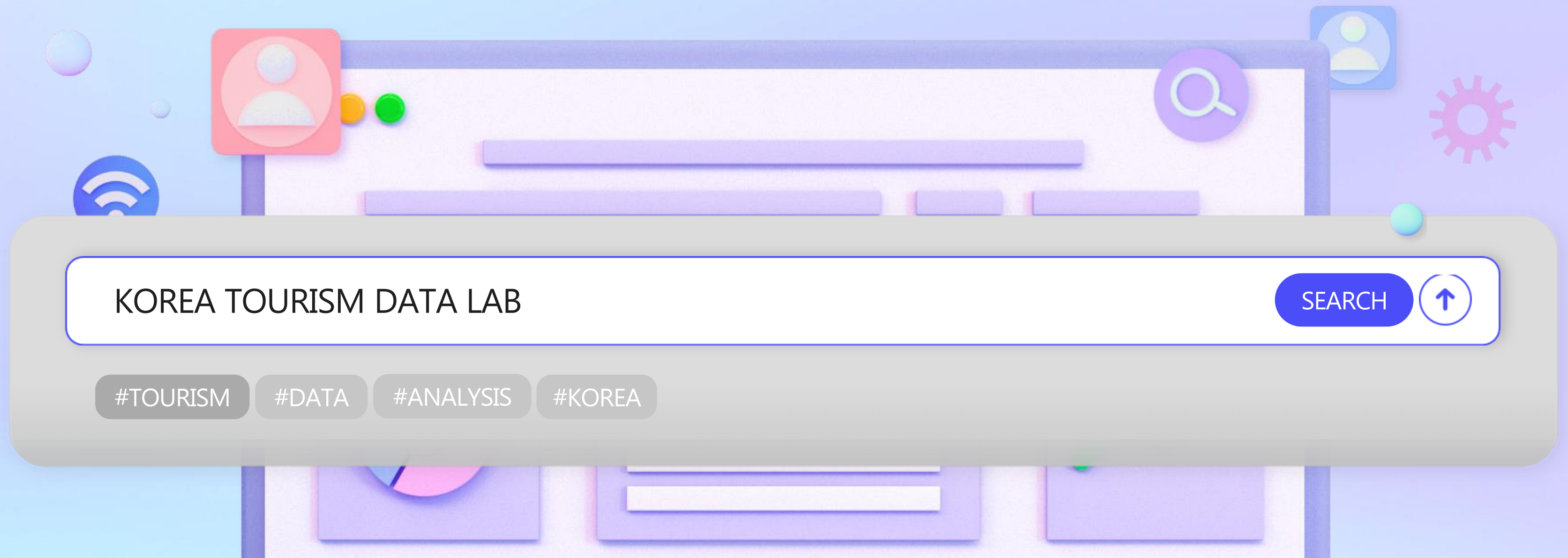
About.

**The Korea Tourism
Data Lab**



The Korea Tourism Data Lab

- (What it is) Tourism-specialized big data platform that provides tourism data and integrated analysis services
- (Target Users) Central and local governments, RTOs, tourism business sectors, academia and etc.
- (Goal) Supporting data-based scientific tourism policy establishment and tourism businesses



The Korea Tourism Data Lab

MAIN PAGE

 KOREA TOURISM DATA LAB

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 user guide book

Login | to MyData Lab | 

Analysis by region

Analysis by country

Tourism industry analysis

big data

Tourism statistics/fact-

Introducing Datalab

한국관광데이터랩 x 대한민국 구석구석

빅데이터가 알려주는

현지인 vs 외지인

전국 맛집 차트!

자세히 보기 >



finding survey

*If you log in, you can see your favorite data.

Tourism status by region

Regional tourism AI analysis

Map of center-related tourist attractions

Statistics of tourists visiting Korea

Overseas travel by country

Tourism business status

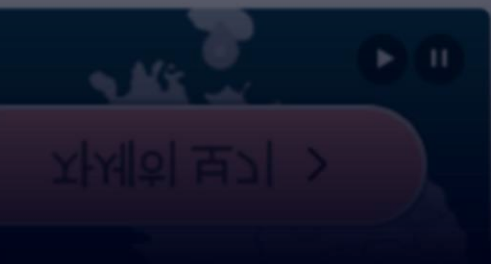
한국관광데이터랩 x 대한민국 구석구석

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The Korea Tourism Data Lab

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Introducing Datalab

TOURISM STATISTICS

Period

Monthly

202301

-

202407

SEARCH

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Inbound Tourism

Outbound Tourism

Gender

Age

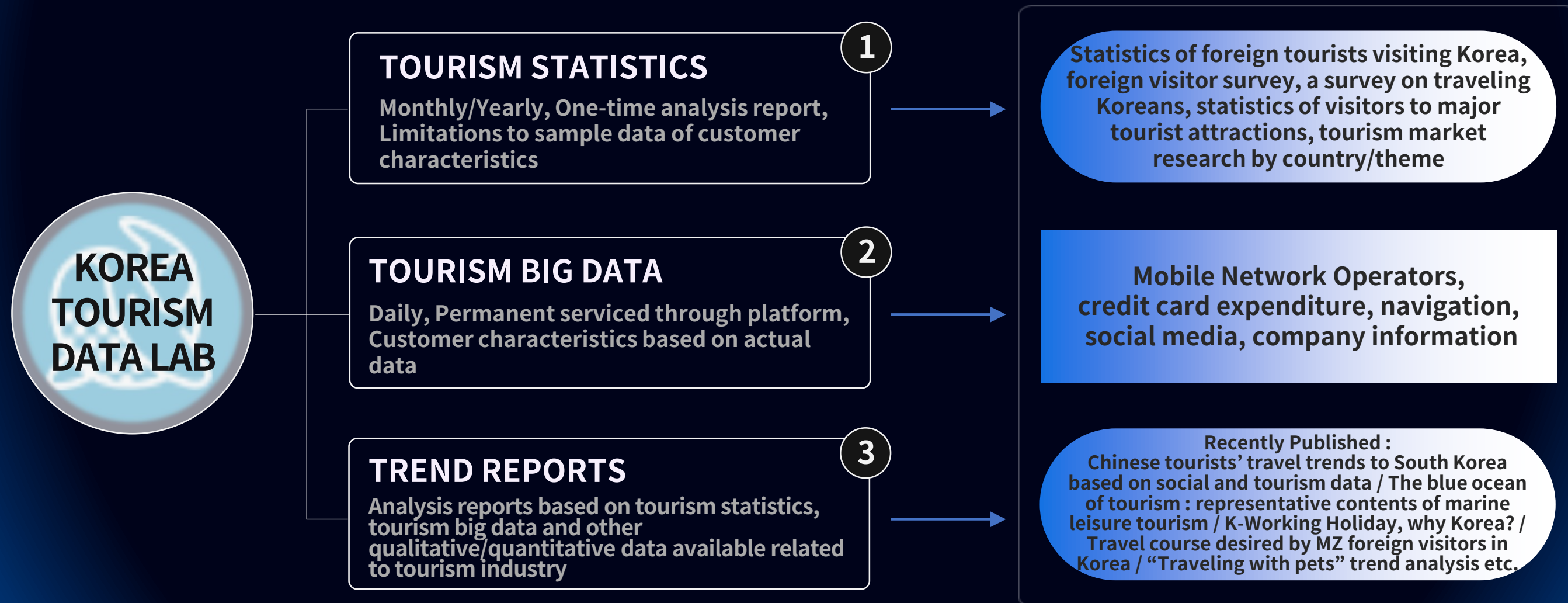
Purpose

Transportation

	Male			Female			Crew	
	Person	Previous year	Change(%)	Person	Previous year	Change(%)	Person	Previous year
> 202301	184,650	28,834	540.4	209,097	13,328	1,468.9	40,682	39,689
> 202302	198,254	36,184	447.9	242,602	28,987	736.9	38,392	34,828
> 202303	188,524	30,184	411.9	245,005	28,281	130.9	38,305	34,858
> 202304	184,481	28,834	240.4	240,005	13,358	1,468.9	40,285	39,689
	Person	Previous year	Change(%)	Person	Previous year	Change(%)	Person	Previous year

Data Lab Main Services

The following are the main data and related services that can be found through data lab missioned to help and support policy-makers and business sectors making a better decision





Chapter 02

Dashboard.
Status of Population
Declining Areas

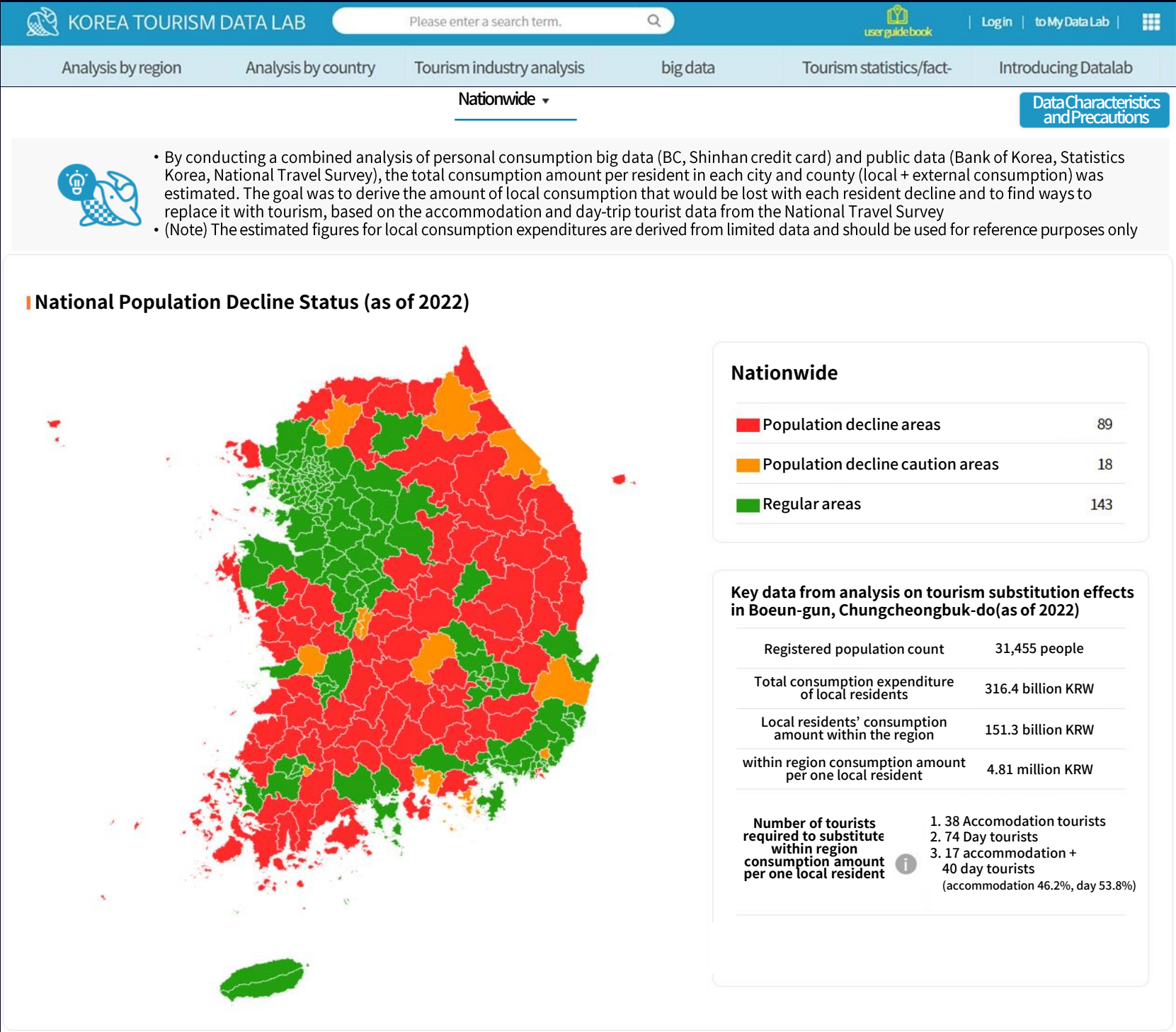
Ch 2. Dashboard

Status of Population Declining Areas

Regional Analysis > Status of Population Decline Areas

> Population Decline Areas Status Map

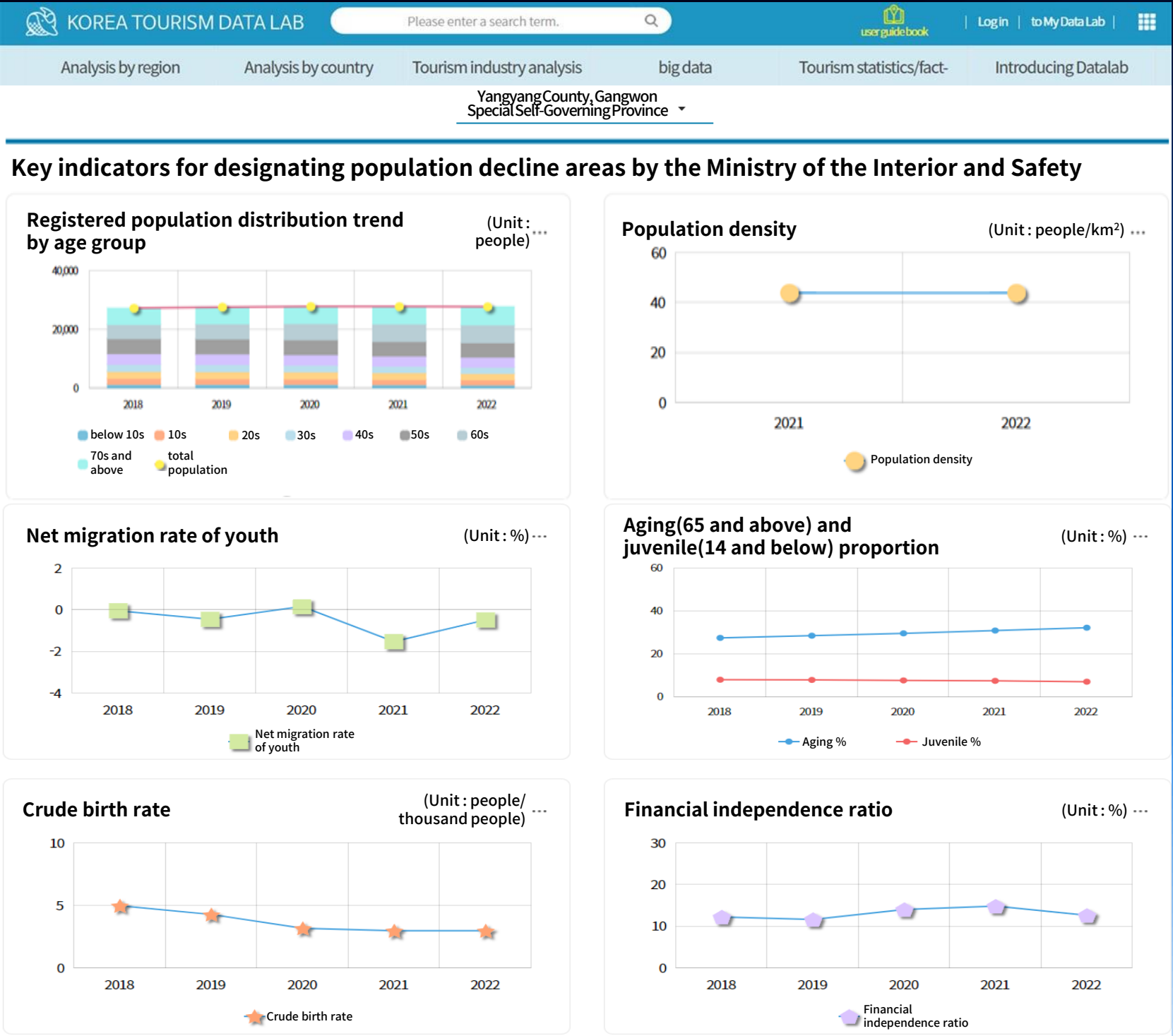
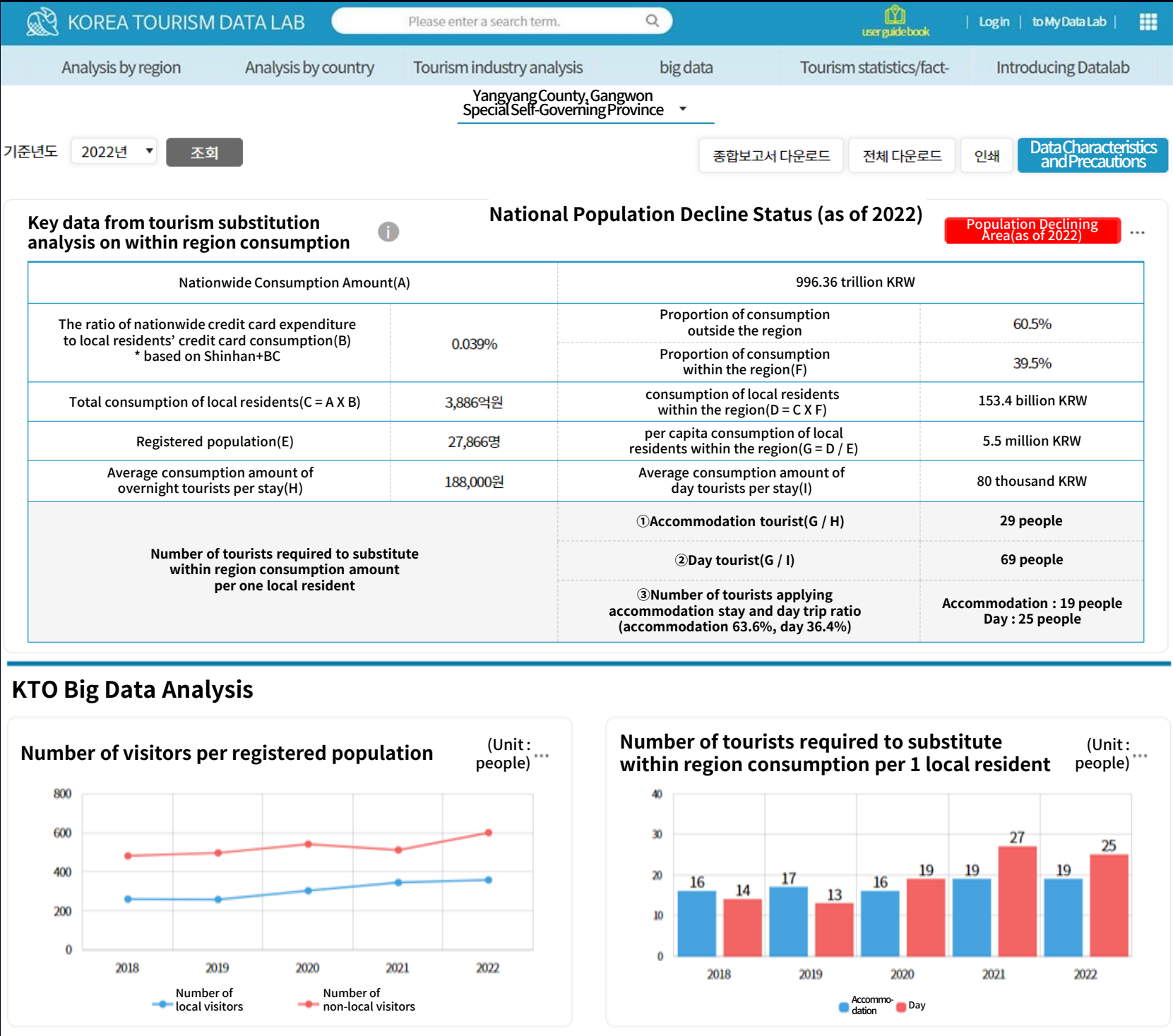
& Status of Regional Tourism and Non-Tourism Consumption



Ch 2. Dashboard

Status of Population Declining Areas

Regional Analysis > Status of Population Decline Areas
> Tourism Substitution Effects by Region



Chapter 03

Crowdedness.

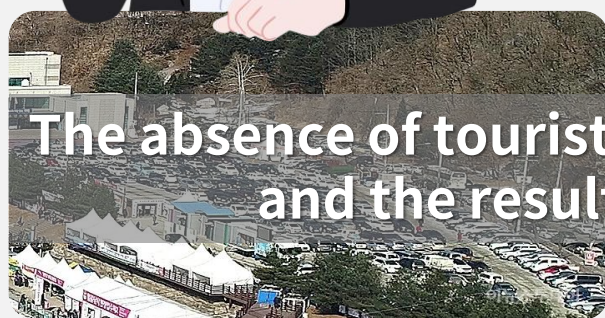
**Measuring congestion in
major tourist destinations**



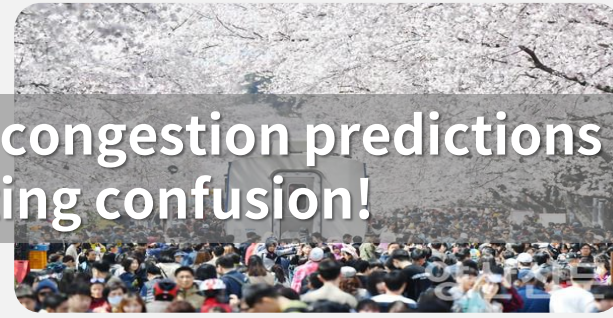
Measuring congestion in major tourist destinations



What if, we could predict the number of tourists and which spots would be crowded when planning a festival?



The absence of tourist congestion predictions and the resulting confusion!



"Why is prediction so difficult?"

- □ □ • The current data system cannot accurately predict where tourists will gather
- 🌐 • Big data aggregated at the municipal level fails to capture detailed crowd movement

The lack of criteria for predicting congestion by type of tourist attraction exacerbates the problem.



Conduct detailed analyses of tourist spots using video data, mobile communication and POI(Point of Interest) data

By combining video data with mobile communication and POI data, an in-depth analyses for each spot can be performed
This allows us to **develop accurate congestion prediction models** that can be applied to different types of tourist attractions

As a result, the following can become possible!

- Maximizing tourist experiences through efficient congestion management
- Establishing a system to predict and proactively respond to congestion at tourist sites
- Optimizing visitor flow to reduce stress & provide comfortable tourism experience
- Expecting tangible results in the operation of festivals and tourist attractions



Ch 3. Crowdedness

Measuring congestion in major tourist destinations

Purpose

So, what are the key areas to focus on in this study?

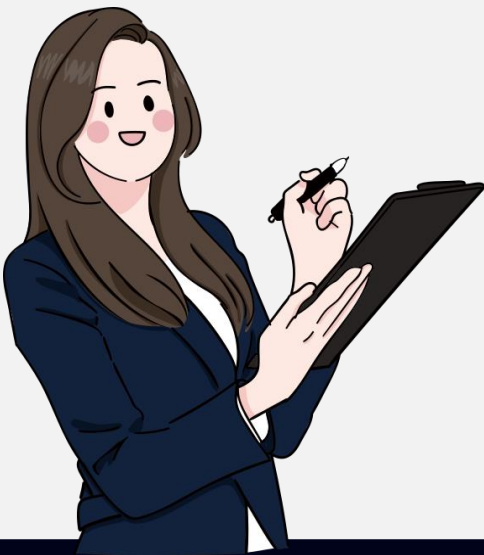
Key Strategy

Definition of Tourist Destination Congestion and Setting Analysis Goals

Standardization Applicable Tourist Destination Selection by Type

Development of Congestion Analysis Models Suitable for Different Types of Situations and Objectives

Suggestions for Potential Future Applications Based on Analysis Results



The following **objectives** should be accomplished through this study

Define Congestion

Definition of Tourist Destination Congestion and Setting Analysis Goals

Clearly define the concept of tourist destination congestion and establish clear analysis objectives for this study



Develop Model

Development of Congestion Analysis Models Suitable for Different Types of Situations and Objectives

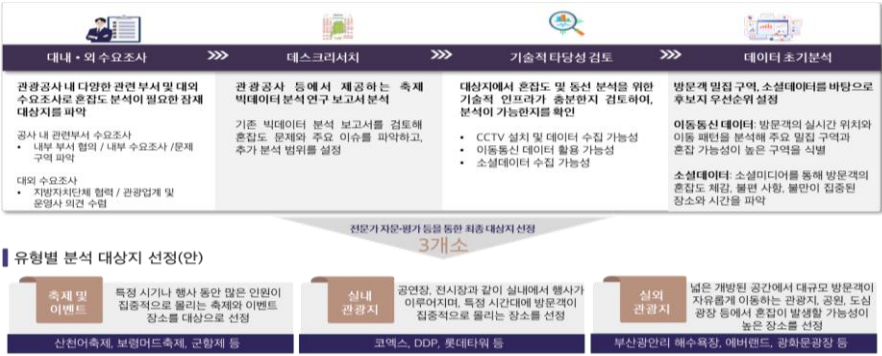
Develop data collection and analysis models suitable for the analysis objectives by type



Select Destination

Standardization Applicable Tourist Destination Selection by Type

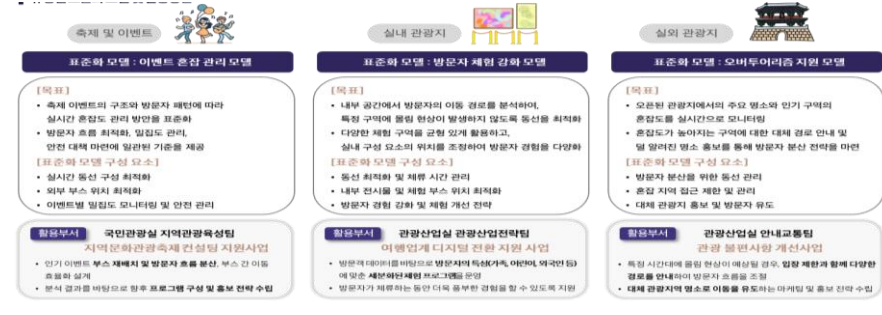
Select destinations based on reasonable and objective criteria that reflect the diversity of tourist destination types



Suggest Application

Suggestions for Potential Future Applications Based on Analysis Results

Develop objective and practical ways to effectively utilize outcomes



Ch 3. Crowdedness

Measuring congestion in major tourist destinations

The 16th Gangneung Coffee Festival
Oct 24th ~ Oct 27th, 2024

Video data has limitations in accurately measuring the number of people, such as inaccuracies in person counting, excessive data processing time, and the inability to track movement paths. These factors make it challenging to measure congestion accurately. It is particularly difficult to measure people inside buildings, under obstacles, or within crowded groups, and its unsuitability for real-time analysis further limits its practicality



Results of Population Density Extraction from Video Data

Extraction Excluded Zones

Extraction Zones

Limitations of Video Data for Congestion Measurement

Inaccuracy in Counting Individuals

It is difficult to measure the number of people using video data in the following situations

- People Inside Buildings
- Overlapping Individuals in Crowds
- Seated Individuals
- People Under Obstacles

High Data Processing Requirements

Video data analysis requires significant processing time, making it inefficient for real-time analysis

Inability to Track Movement Paths

Relying solely on video data makes it challenging to accurately track visitors' movement paths or analyze flow patterns

Measuring congestion in major tourist destinations

The 16th Gangneung Coffee Festival
Oct 24th ~ Oct 27th, 2024

Reflecting the expert opinion that there are limitations to using video data for congestion measurement, data collection at the target site was carried out using both drones and IoT devices. In the subsequent second and third target sites, the more efficient method for collecting congestion data was selected and implemented

Data collection target and installation location



✓ Data collection date and location

Duration : Oct 24th ~ Oct 27th, 2024,
for four days

Location : Gangneung Coffee Street
(Anmok Beach) and the surrounding
areas of Gangneung City

✓ Data Collection Methods

Video data : Drone footage was taken at
one-hour intervals in the event area

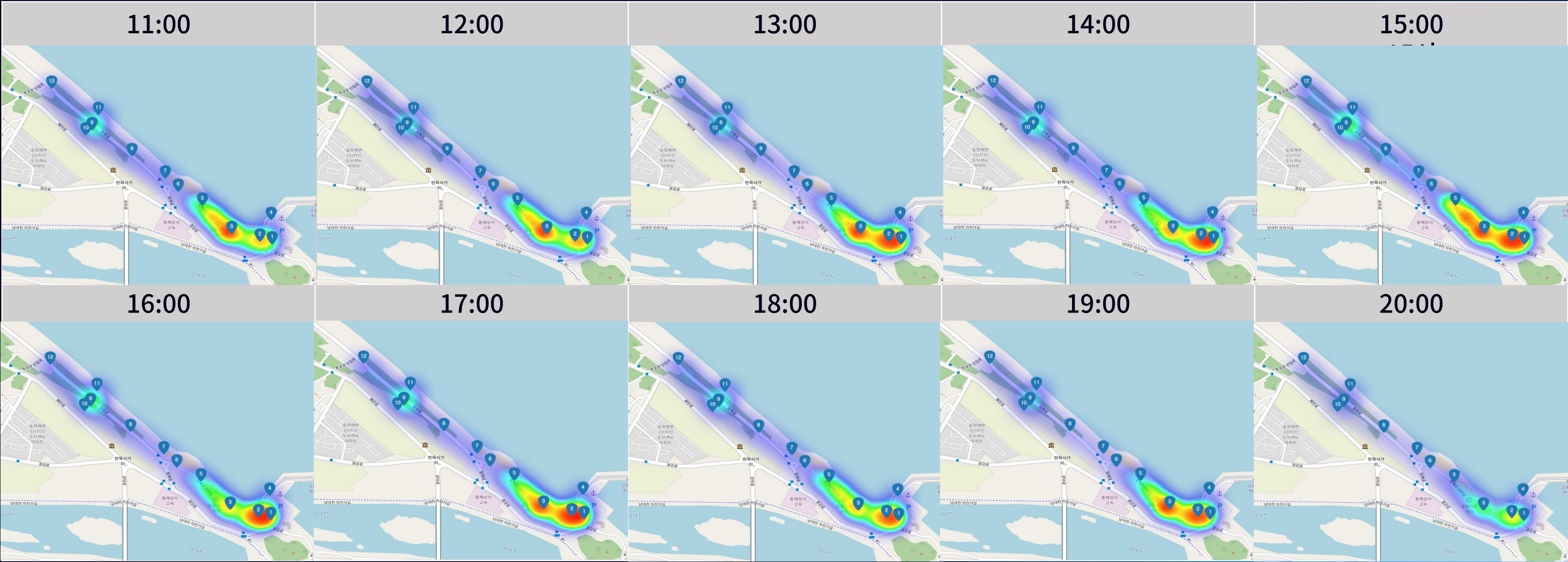
IoT locations: Twelve locations within the
festival were designated, and equipment
was installed for data collection

Ch 3. Crowdedness

Measuring congestion in
major tourist destinations

The 16th Gangneung Coffee Festival
Oct 24th ~ Oct 27th, 2024

Spatio-temporal Analysis(HITMAP) - DAY1, Oct 24th(Thur)



Key findings

- The congestion analysis results for the Gangneung Coffee Festival identified "Coffee Picnic" and "Information Booth 2" as the main congested areas.
- The highest congestion was recorded during the evening hours (18:00–20:00). During the daytime (11:00–16:00), the congestion was more spread out, while in the evening (17:00–20:00), there was a concentration of visitors, leading to an increase in congestion in specific areas.



Chapter 4

Vitalization. Development of the Tourism Vitalization Index

Development of the Tourism Vitalization Index

Index Development Process
Introduction of the International
Standard Tourism Indicator System

A qualitative index consisting of 9 categories and 100 detailed indicators across 2 major areas was developed, based on international standard tourism indicators, to establish a framework for sustainable tourism development

In accordance with the Travel & Tourism Development Index(TTDI) proposed by the WEF, a domestic version was customized to develop a qualitative index

Comparison of the TTDI and the Regional Tourism Vitalization Index

T&T Development Index



Area	Index
Enabling Environ-ment	Business Environment
	Safety and Security
	Health and Hygiene
	HR and Labour Market
	ICT Readiness
Tourism Policy and Enabling Conditions	Prioritization of T&T
	Openness to T&T
	Price Competitiveness
Infrastruc-ture	Air Transport Infrastructure
	Ground and Port Infrastructure
	Tourist Services and Infra
T&T Resources	Natural Resources
	Cultural Resources
	Non-Leisure Resources
T&T Sustain-ability	Environmental Sustainability
	T&T Socioeconomic Impact
	T&T Demand Sustainability

Regional Tourism Vitalization Index



Index	Area
Enabling Environment	Tourism Supply Competi-tiveness Index
Tourism Policy and Enabling Conditions	
Infrastructure	
Tourism Demand Promotion Factors	
Tourism Sustainability	
Tourism Resource Demand	Tourism Demand Competi-tiveness Index
Tourism Demand Intensity	
Tourism Diversity	
Tourism Travel Distance	

Regional Tourism Vitalization Index Evaluation Indicators

Tourism Supply Competitiveness Index
(5 categories, 12 subcategories, and 41 detailed indicators)

Enabling Environment

Safety and Security

Health and Hygiene

HR and Labour Market

ICT Readiness

Tourism Policy and Enabling Conditions

Prioritization of Tourism

Price Competitiveness

Infrastructure

Ground & Transportation Infra

Tourist Services and Infra

Tourism Demand Promotion Factors

Natural Resources

Cultural Resources

Tourism Sustainability

Environmental Sustainability

Socioeconomic Resilience and Conditions

Tourism Demand Competitiveness Index
(4 categories, 8 subcategories, and 59 detailed indicators)

Tourism Resource Demand

Tourism Service Demand

Cultural and Natural Resource Demand

Tourism Diversity

Tourist Diversity

Tourism Consumption Diversity

International Diversity

Tourism Demand Intensity

Tourism Residence Intensity

Tourism Consumption Intensity

Tourism Travel Distance

Travel Distance

Development of the Tourism Vitalization Index

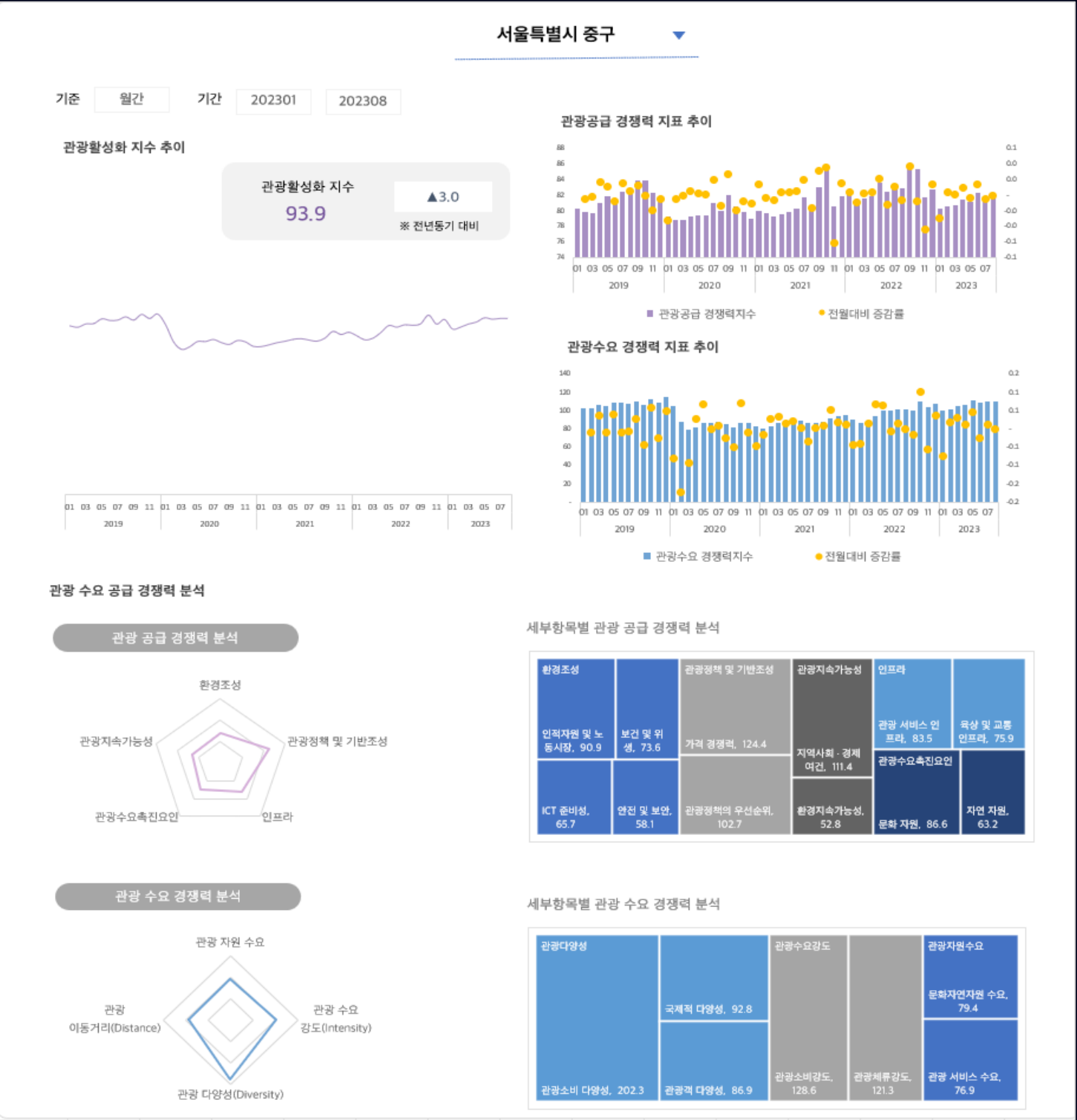
Indicator Composition

The tourism supply competitiveness indicators consist of 5 main categories, 12 subcategories, and 41 detailed indicators, while the tourism demand competitiveness indicators consist of 4 major categories, 8 subcategories, and 59 detailed indicators

Tourism Supply Competitiveness Index						Tourism Demand Competitiveness Index					
Category	Sub-cat	Name of Index	Category	Sub-cat	Name of Index	Category	Sub-cat	Name of Index	Category	Sub-cat	Name of Index
Enabling Environment	Safety and Security	Crime	Infrastructure	Ground & Transportation Infrastructure	Parking Lot Area	Tourism Resource Demand	Tourism Service Demand	Leisure Sports Mentions on SNS	Tourism Diversity	Tourist Diversity	# of Visitors(10s)
		Public Safety			Road Area			Rest and Healing Mentions on SNS			...
		Infectious Diseases			Railroad Area			Gourmet Travel Mentions on SNS			
	Health and Hygiene	Number of Doctors			Railway Station Availability			Experience Travel Mentions on SNS		Tourism Consumption Diversity	# of Visitors(70s)
		Number of Hospital Beds			Express Bus Terminal Availability			Shopping Expenditure			Expenditure(10s)
	HR and Labour Market	# of Tourism Employees to # of Tourism Businesses		Tourism Service Infrastructure	# of City Tour Bus Routes			Food Service Expenditure			...
		# of Tourism Industry Employees to Total Industry Employees			# of Accommodation Business			Accommodation Expenditure		International Diversity	Foreign Expenditure
		# of Tourism Businesses	Tourism Demand Promotion Factors	Natural Resources	# of Food Service Business			Leisure Services Expenditure			Number of Foreign Visitors
		# of Tourism Employees			Park Area			Transportation Expenditure	Tourism Travel Distance	Travel Distance	...
		# of New Accommodation Businesses			River Area		Cultural and Natural Resource Demand	Accommodation Navigation Search			Jeju Special Self-Governing Province
		# of New Food Service Businesses			Amusement Park Area			Food Types Navigation Search			
Tourism Policy and Enabling Conditions	ICT Readiness	Number of Public Wi-Fi Spots		Tourism Sustainability	Sports Facility Area			Shopping Navigation Search			
		Proportion of Tourism Officials			# of KTO Project Sites		Tourism Residence Intensity	Cultural and Tourism Navigation Search			
		Tourism Budget			# of Designated Major Tourist Spots			Leisure Sports Navigation Search			
	Prioritization of Tourism	Number of Cultural Tourism Press Releases			Number of Festivals Held			Historical Tourism Navigation Search			
		Fiscal Independence Ratio			Number of Museums			Experiential Tourism Navigation Search			
		Regional Fuel Price Data			Fine Dust Concentration			Nature Tourism Navigation Search			
	Price Competitiveness	Rental Market Prices			Green Area Ratio	Tourism Demand Intensity	Tourism Consumption Intensity	% of Visitors from Other Regions			
					General Waste Recycling Rate (A÷B×100) (%)			% of Accommodation Expenditure			
					Socioeconomic Resilience and Conditions			# of One-Night Visitors			
	Socioeconomic Resilience and Conditions				Social Welfare Facilities per 0.1 mil ppl		Tourism Consumption Intensity	# of Two-Night Visitors			
					Economic Activity Participation Rate (%)			# of Three-Night or Longer Visitors			
					# of "Tourism Community" Program Sites			Expenditure by Non-Local Visitors			
	Socioeconomic Resilience and Conditions				# of Accessible Tourist Sites			Proportion of Non-Local Expenditure to Total			
								Expenditure per Visitor Compared to Number of Visits			

Development of the Tourism Vitalization Index

Visualization Example
Tourism Vitalization Index of Jung-gu, Seoul



- The average monthly tourism revitalization index for Jung-gu, Seoul, from January to August 2023 is 93.9 points, which is a 3-point increase compared to the same period last year.
 - In terms of tourism supply competitiveness, the region shows relatively high competitiveness in the areas of Tourism Policy and Enabling Conditions, while in tourism demand competitiveness, it demonstrates high competitiveness in the area of tourism diversity.
- Tourism Supply Competitiveness Indicators in Jung-gu, Seoul (Detailed Score Distribution)
 - ✓ Environmental Development (Safety and Security: 58.1, Health and Hygiene: 73.6, Human Resources and Labor Market: 90.9, ICT Readiness: 65.7)
 - ✓ **Tourism Policy and Enabling Conditions**(Prioritization of Tourism: 102.7, Price Competitiveness: 124.4)
 - ✓ Infrastructure(Ground and Transportation Infrastructure: 75.9, Tourism Service Infrastructure: 83.5)
 - ✓ Tourism Demand Promotion Factors(Natural Resources: 63.2, Cultural Resources: 86.6)
 - ✓ Tourism Sustainability(Environmental Sustainability: 52.8, Socioeconomic Resilience and Conditions: 111.4)
 - Tourism Demand Competitiveness Indicators in Jung-gu, Seoul (Detailed Score Distribution)
 - ✓ Tourism Resource Demand(Tourism Service Demand: 76.9, Cultural and Natural Resource Demand: 79.4)
 - ✓ Tourism Demand Intensity(Tourism Residence Intensity: 121.3, Tourism Consumption Intensity: 128.6)
 - ✓ **Tourism Diversity**(Tourist Diversity: 86.9, Tourism Consumption Diversity: 202.3, International Diversity: 92.8)
 - ✓ Tourism Travel Distance(Travel Distance: 92.8)

Thank you for your attention!

Measuring crowdedness and
tourism vitalization with data and AI



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KOREA TOURISM ORGANIZATION