MODUL UNIVERSITY
PRIVATE UNIVERSITY VIENNA

EUROPEAN TRAVEL COMMISSION

CITY DESTINATIONS ALLIANCE

NECSTouR
European Regions for Competitive and Sustainable Tourism

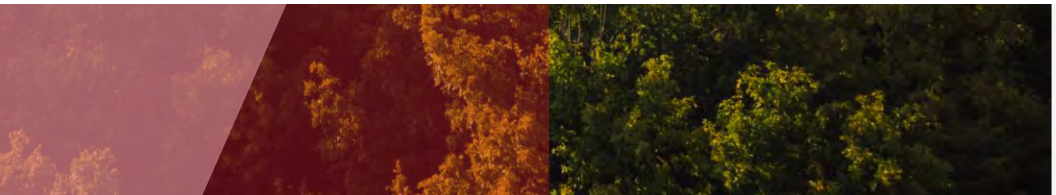
Part II
Analysis and Reporting Features

TOURMIS WORKSHOP

21st TourMIS Workshop

Adoption of impact models among NTOs and DMOs

September 10-11, 2026



Austrian National Tourist Office
www.tourmis.info

VIENNA
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Overview of the afternoon

1. Benchmarking tourism destinations
2. New: The database on Regional Tourism Statistics

14:45-15:15 coffee break

3. Estimating CO2 emissions caused by tourism transportation
4. New: Tourist tax collected by accommodation providers
5. New: Daily spending per overnight tourist
6. The future development of TourMIS

I. Benchmarking tourism destinations

1. Market volumes, market shares (NRC)
2. Measuring seasonality in European destinations (NRC)
3. Diversity of guest mix analysis (NRC)
4. The distribution of the average length of stay per stay (NRC)
5. Sustainability indicators (NRC)
6. Density & intensity (NC)
7. Capacities and occupancy (NC)
8. Attractions and sights (NC)
9. Portfolio analysis (NC)
10. Estimating CO2 emissions caused by tourism transportation (NC)
11. Meetings industry (C)
12. Closest airports (C)
13. Rail connections (C)

N = European Countries R = Regions C = Cities

(1) Market volumes, market shares (NRC)

From comparing trends in one destination to monitoring market volumes and analysing market shares ...

European Countries >> Annual data reports >> Annual data

For one destination

	1 or 2 year(s)		Trend	
Nights and arrivals	for various markets	ⓘ	for a market	ⓘ
	for various markets and benchmark	ⓘ	for a market and benchmark	ⓘ
			for all definitions	ⓘ
Length of stay	for various markets	ⓘ	for on market and several years	ⓘ
	in nights per stay (estimated)	ⓘ		
Sustainability	transportation-caused CO2	ⓘ	transportation-caused CO2	ⓘ
	Sustainability indicators	ⓘ		

For one market

	1 or 2 year(s)		Trend	
Nights and arrivals	in all destinations	ⓘ	in all destinations	ⓘ
Length of stay	in all destinations	ⓘ		
Daily spending	in all destinations	ⓘ		
Density & intensity	in all destinations	ⓘ	for a destination and benchmark	ⓘ

(2) Measuring seasonality in European destinations (NRC)

Causes of seasonality in tourism

- **Seasonality: The systematic intra-year variation in visitation caused by exogenous factors**
  - Natural (e.g. climate)
  - Institutional
    - caused by the markets of origin (e.g. timing of school holidays)
    - caused by the destination (e.g. regular mega-events)
  - Calendar effects (e.g. Easter)

- **Challenges**
  - The need to optimize the use of tourism infrastructure such as roads to accommodate high flows during certain periods
  - Seasonality increases the risk of high unemployment during the low seasons
  - In dryer regions the issue of water scarcity is of particular concern

Actions to overcome seasonality

- **Product**

  Development of new offers, events, packages, ...

- **Pricing**

  Providing discounts for periods with less demand

- **Promotion**

  When and how intensively we will promote the tourism products

- **Placement**

  Which geographic region/market should be promoted

  Which segments (e.g. young adults, families, business people)

Measuring seasonality in TourMIS

Cities >> Monthly data reports >> Monthly data

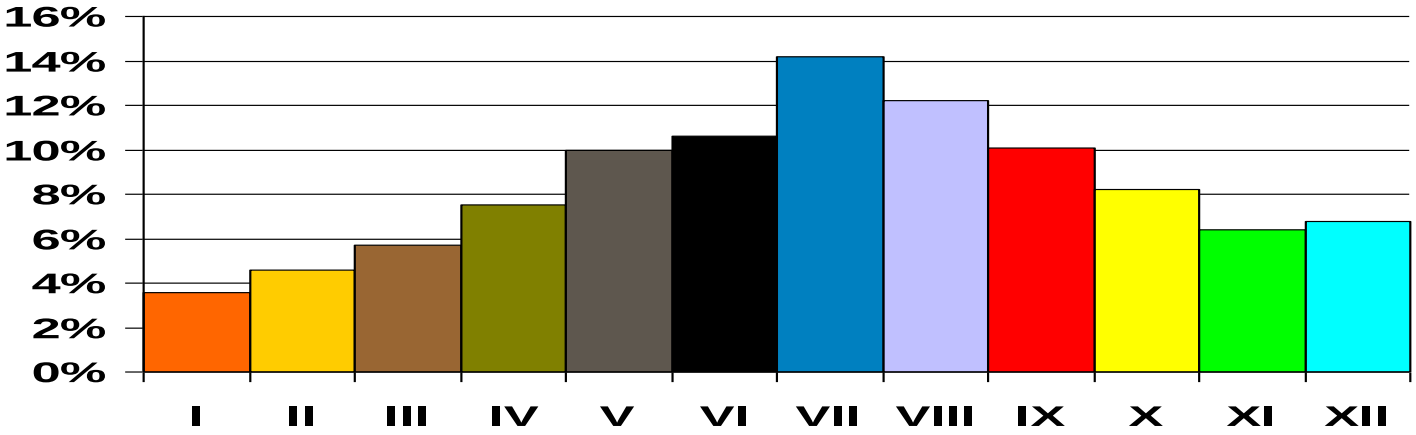
For one destination

	1 or 2 year(s)	Trend
	for various markets	for one market and several months
Nights and arrivals	assessing seasonality	
	comparison of months or seasons	
Length of stay	for various markets	for one market and several months

For one market

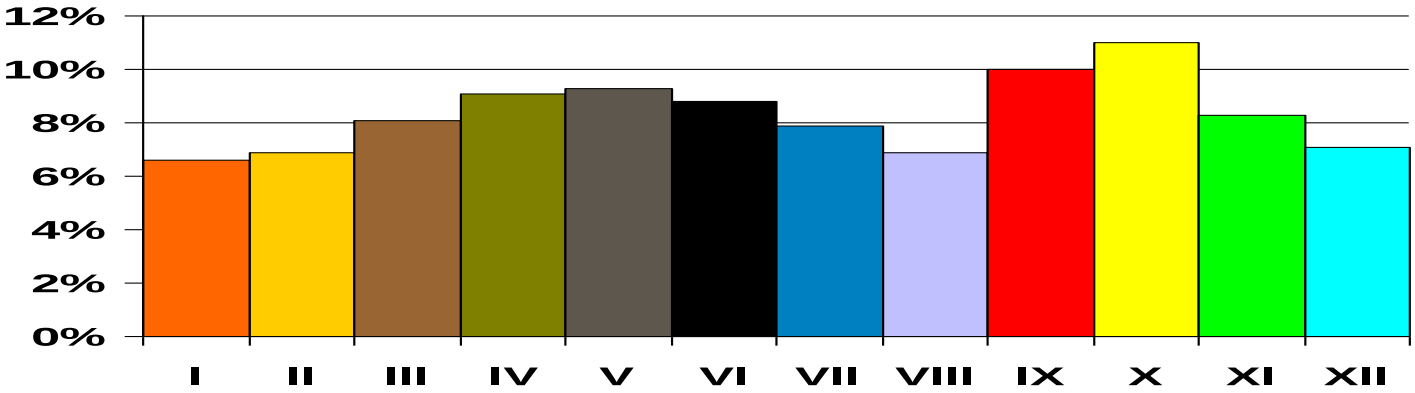
	1 or 2 year(s)	Trend
	in all cities (one month)	
Nights and arrivals	benchmark seasons	
	in all cities (all months)	
Length of stay	in all cities	
Density & intensity	in all cities	for a city and benchmark

Gini coefficient



LÜBECK

Gini=0.207



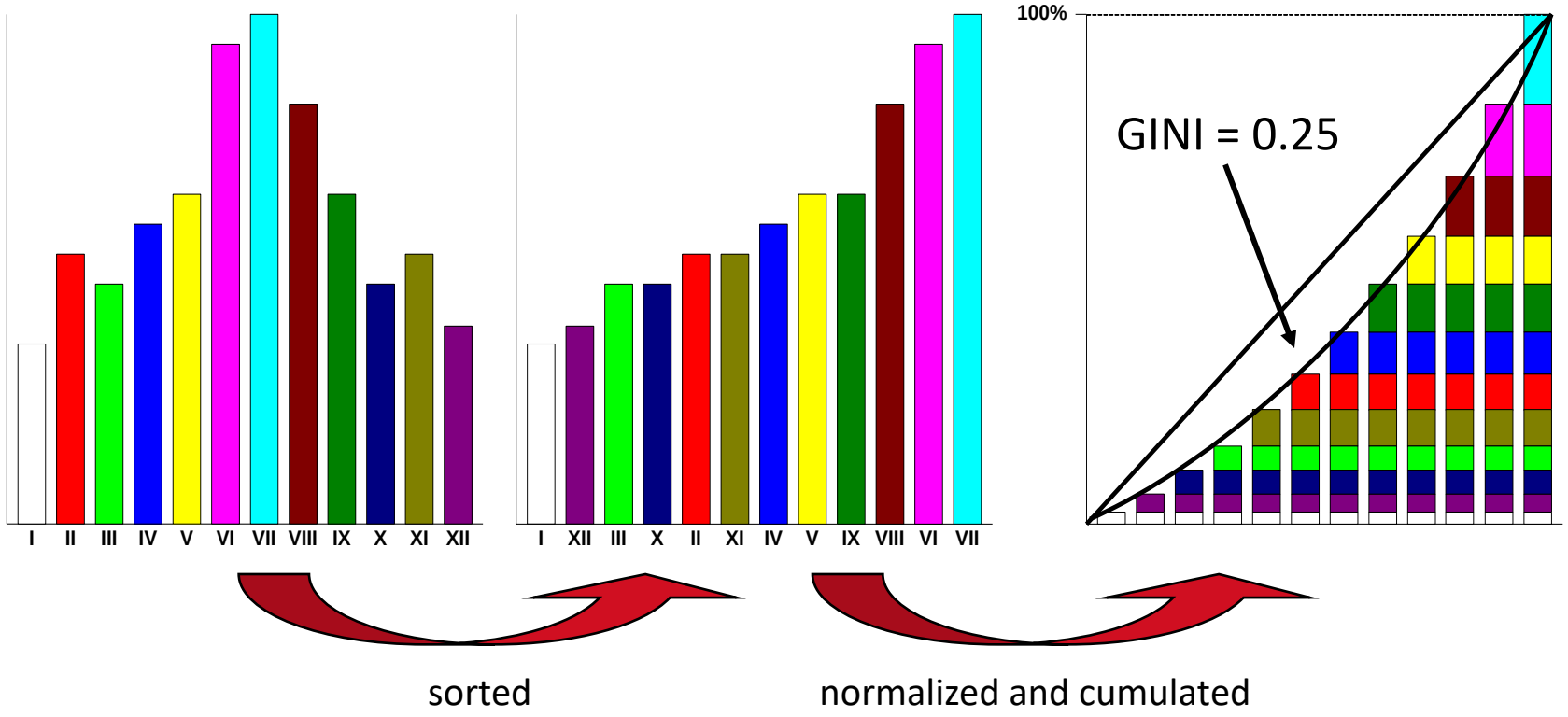
MADRID

Gini=0.088

Gini coefficient

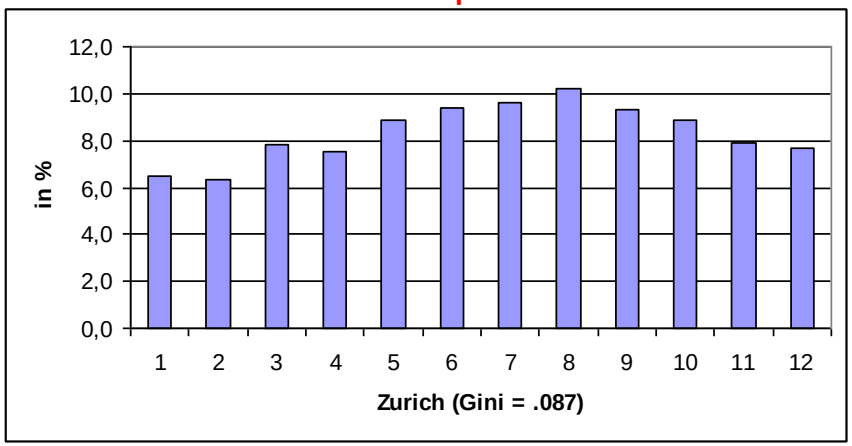
Measure of statistical dispersion. The Gini can be approximated with trapezoids:

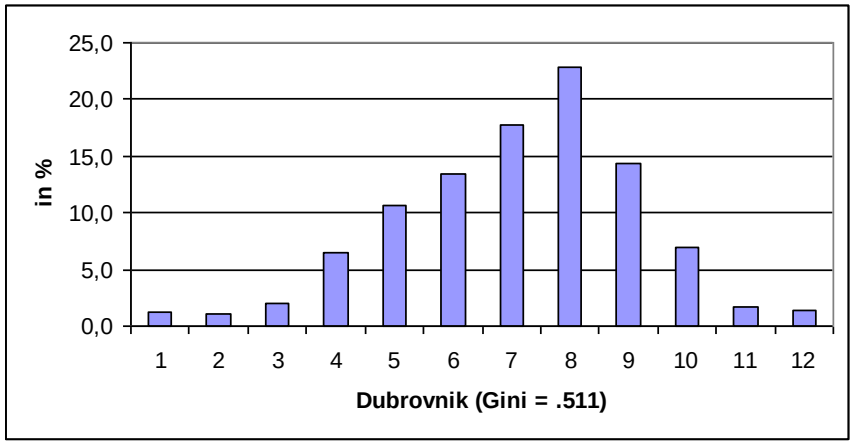
$$G^* = 1 - \sum_{i=1}^{12} \left(X_i - X_{i-1}\right) \times \left(Y_i + Y_{i-1}\right)$$



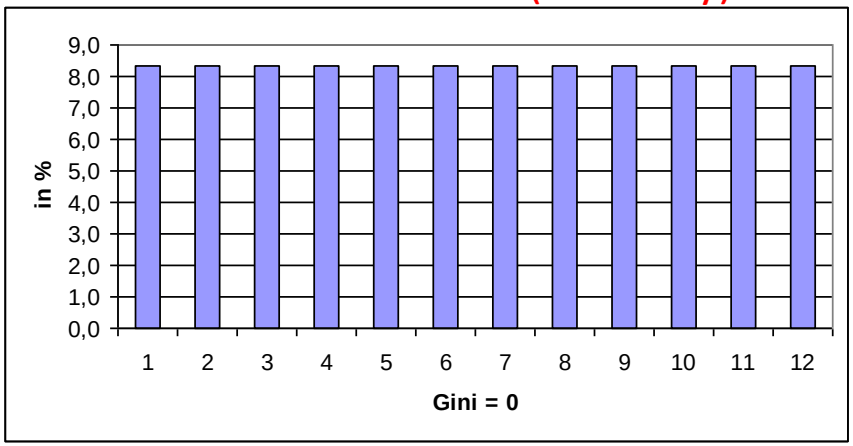
Measuring seasonality

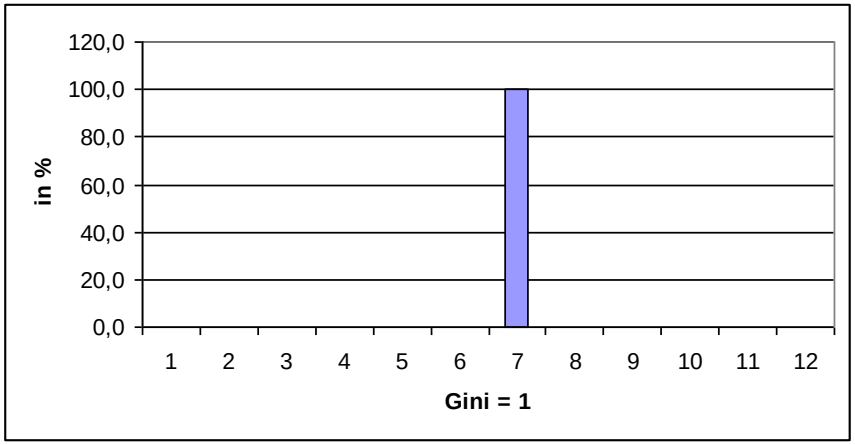
Examples



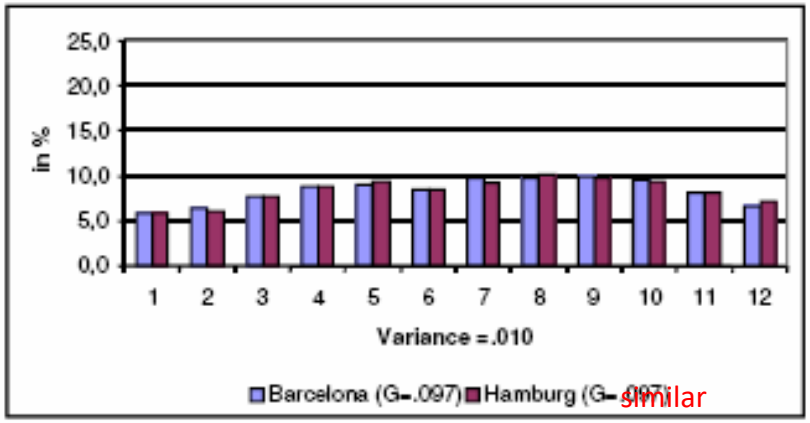


Extreme situations (in theory)





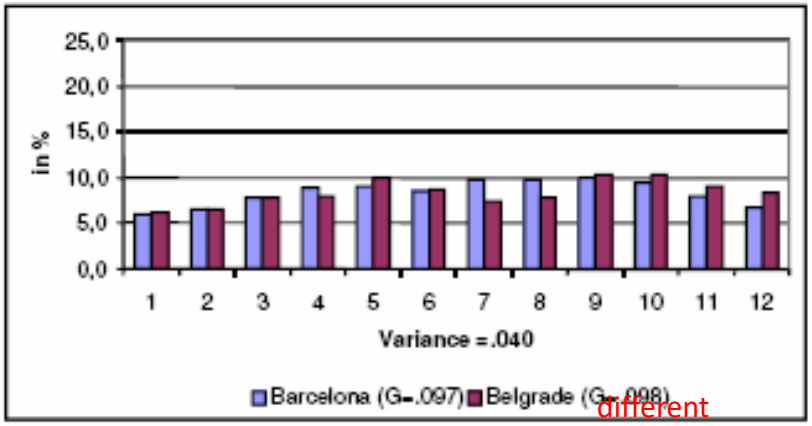
Similarity of seasonal patterns



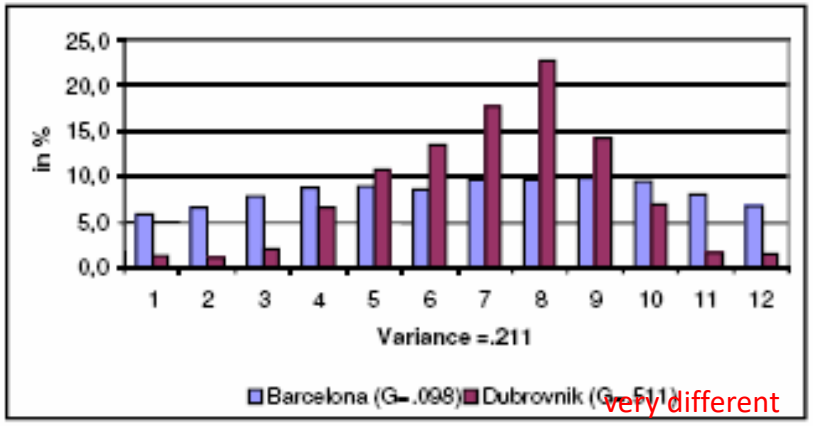
similar

$$d = \sqrt{\sum_{i=1}^{12} (x_i - y_i)^2}$$

Similarity of seasonal patterns of two destinations. Multiple destinations?



different

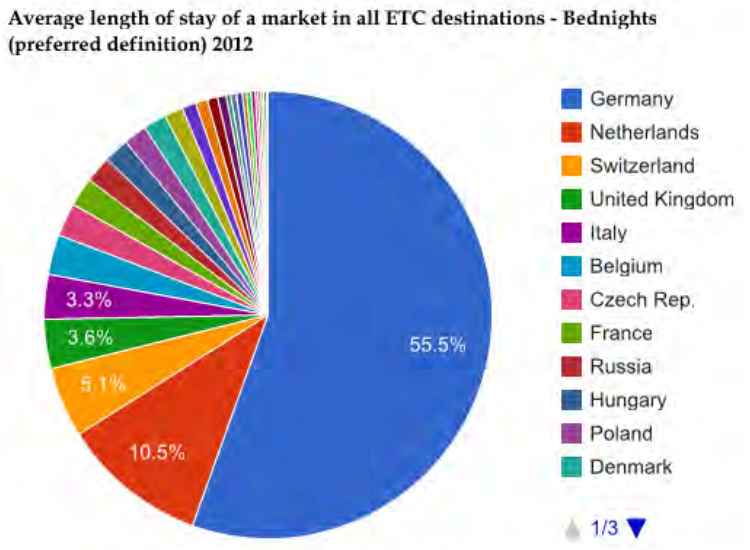


very different

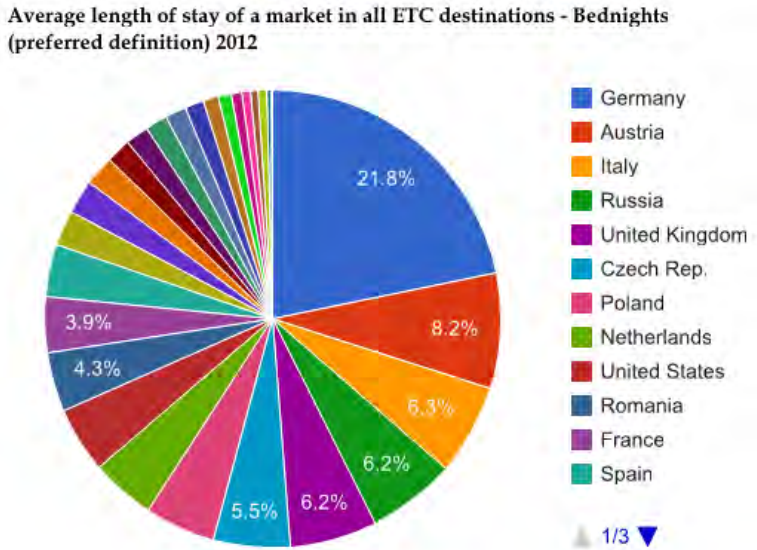
(3) Diversity of guest mix analysis (NRC)

Diversity of guest mix

Assumption: A high diversity of guest mix spreads the risk of negative economic developments in single markets



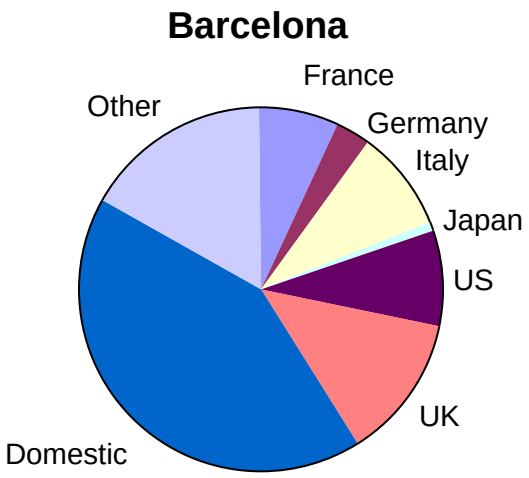
Austria (Gini = 0.792)



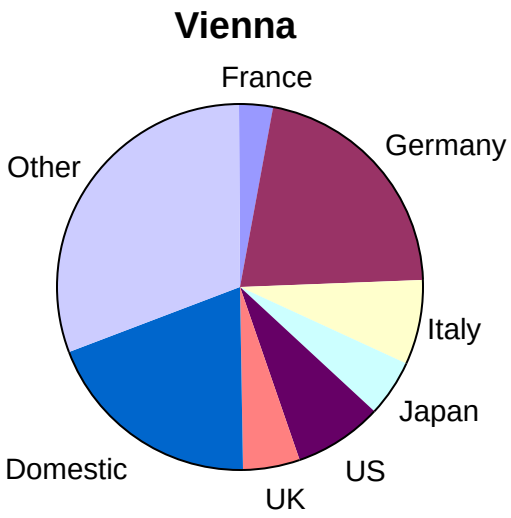
Hungary (Gini = 0.525)

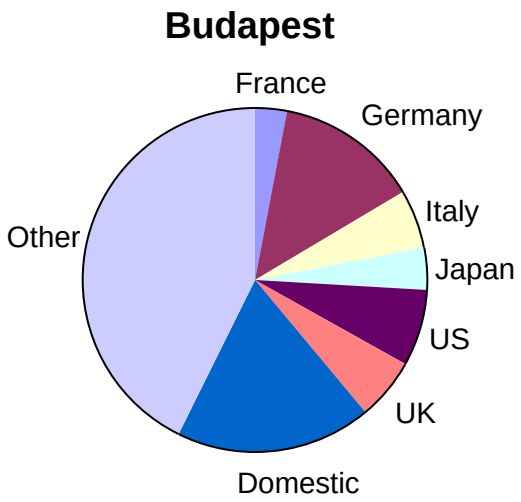
Analyzing the similarity of guest mix

Assumption: The comparison (variance) of guest mix shares defines a destination's exposure to interregional competition



V = 0.364





V = 0.193

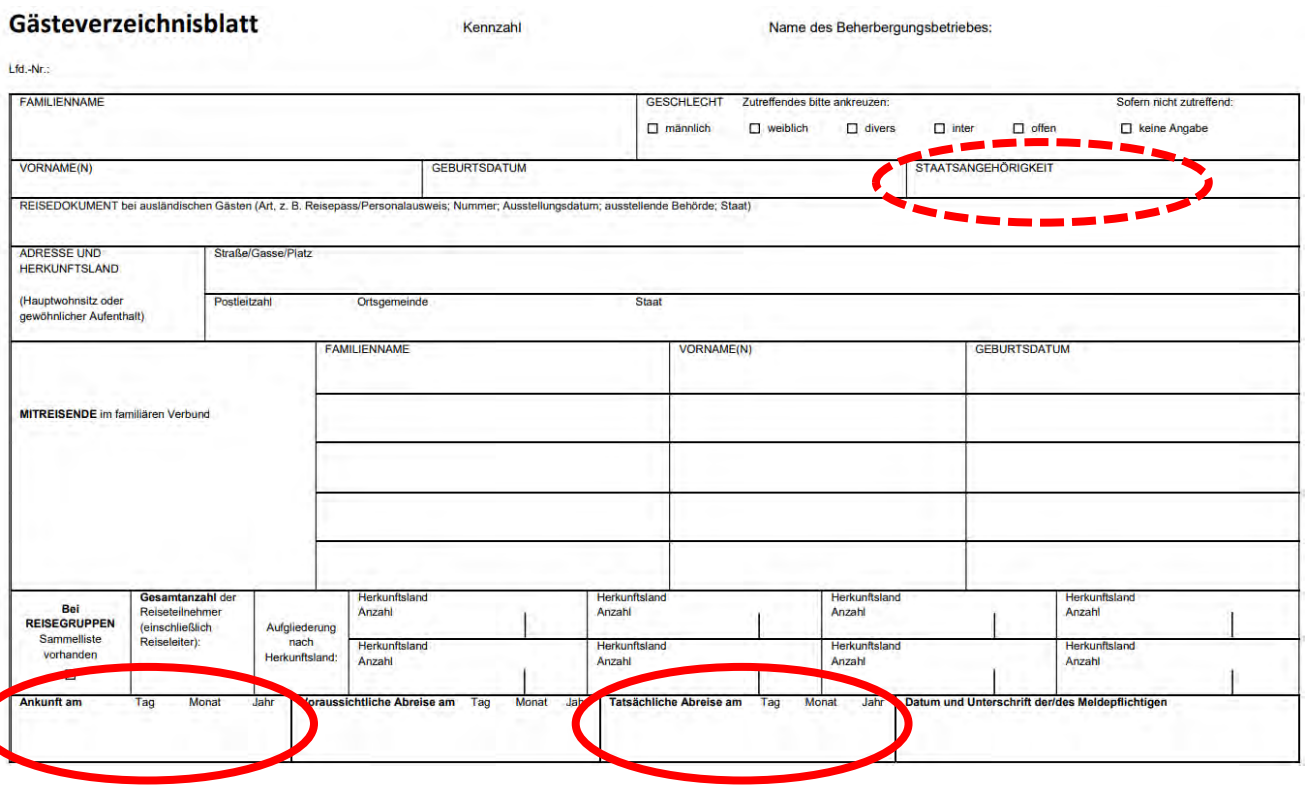
(4) The distribution of the average length of stay per stay (NRC)

ALS: Important KPI in Destination Management

Assumption: Increasing the ALS has a positive impact on destinations

- Economic benefits
  - Higher total spending per trip
  - Better revenue distribution
- Environmental benefits
  - Reduced carbon footprint per tourist
  - Less strain on infrastructure
- Social and cultural benefits
  - Deeper cultural engagement
  - Better local-tourist relationships
  - More job stability

Guest directory sheets in Austria as of 1/2023



Gästeverzeichnisblatt

Kennzahl

Name des Beherbergungsbetriebes:

Lfd.-Nr.:

FAMILIENNAME

GESCHLECHT Zutreffendes bitte ankreuzen: ☐ männlich ☐ weiblich ☐ divers ☐ inter ☐ offen

Sofern nicht zutreffend: ☐ keine Angabe

VORNAME(N)

GEBURTSDATUM

STAATSANGEHÖRIGKEIT

REISEDOKUMENT bei ausländischen Gästen (Art, z. B. Reisepass/Personalausweis; Nummer; Ausstellungsdatum; ausstellende Behörde; Staat)

ADRESSE UND HERKUNFTSLAND

(Hauptwohnsitz oder gewöhnlicher Aufenthalt)

Straße/Gasse/Platz

Postleitzahl Ortsgemeinde Staat

MITREISENDE im familiären Verbund

FAMILIENNAME	VORNAME(N)	GEBURTSDATUM

Bei REISEGRUPPEN Sammelliste vorhanden ☐

Gesamtanzahl der Reiseteilnehmer (einschließlich Reiseleiter):

Aufgliederung nach Herkunftsland:

Herkunftsland Anzahl | Herkunftsland Anzahl | Herkunftsland Anzahl | Herkunftsland Anzahl

Herkunftsland Anzahl | Herkunftsland Anzahl | Herkunftsland Anzahl | Herkunftsland Anzahl

Ankunft am Tag Monat Jahr

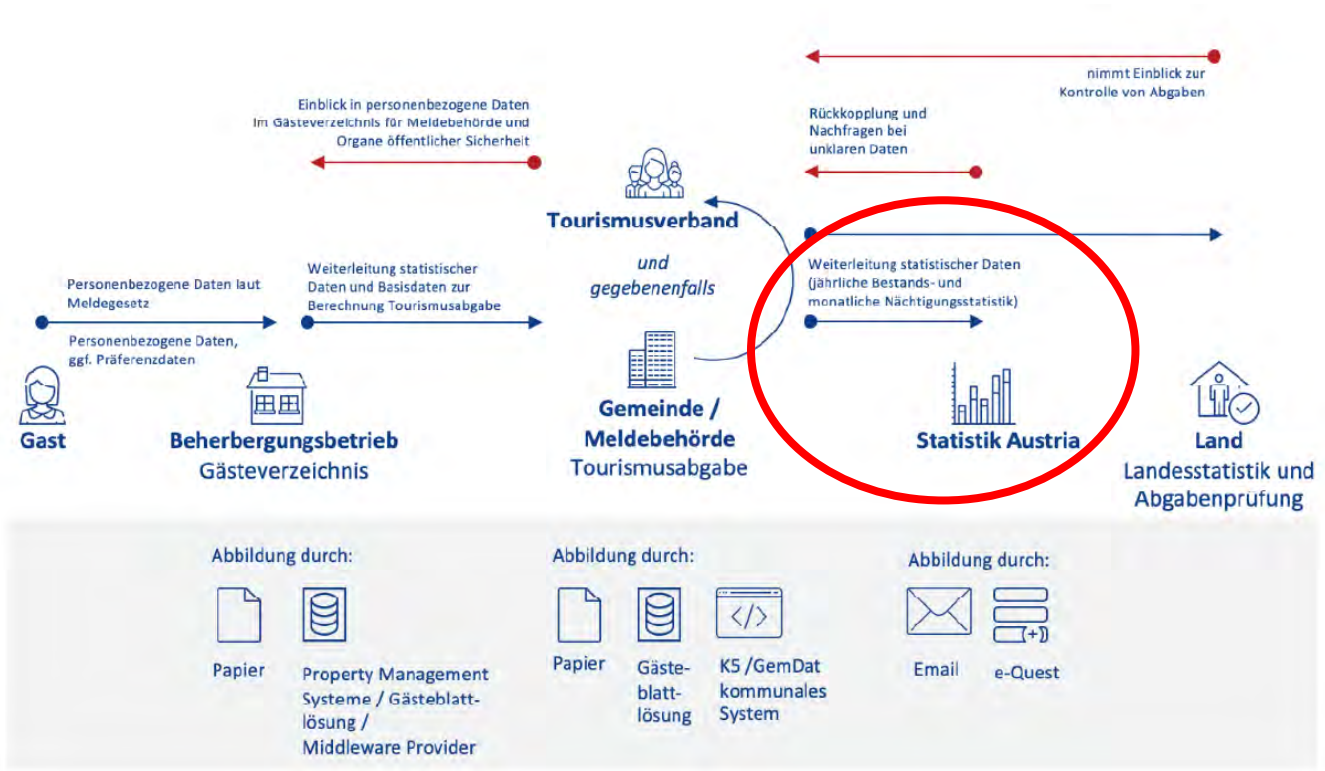
Voraussichtliche Abreise am Tag Monat Jahr

Tatsächliche Abreise am Tag Monat Jahr

Datum und Unterschrift der/des Meldepflichtigen

Source: Meldegesetz-Durchführungsverordnung (MeldeV)
StF: BGBl. II Nr. 66/2002

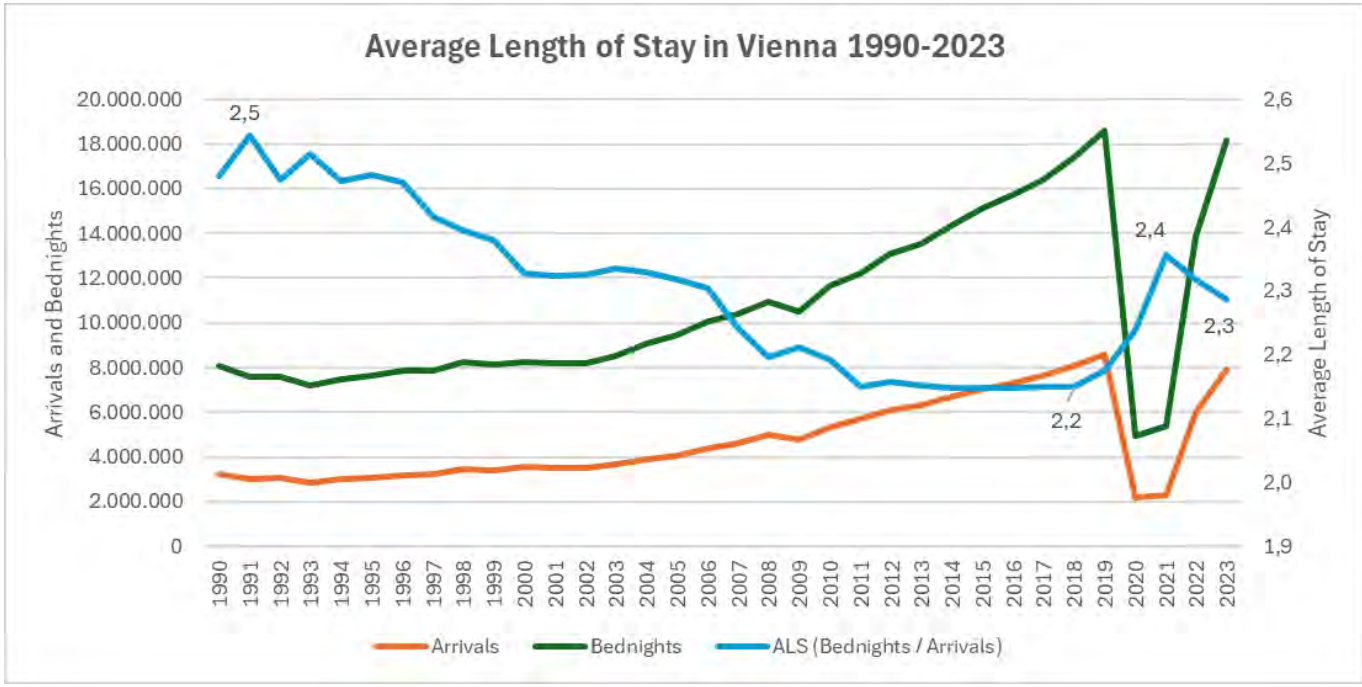
Guest Data Processing in Austria



Information on the **distribution** of overnights per length of stay gets lost during the data collection, analysis, and reporting process!

Source: Feasibility Study: Digitales Gästeblatt, BMAW, 27. Dez 2022

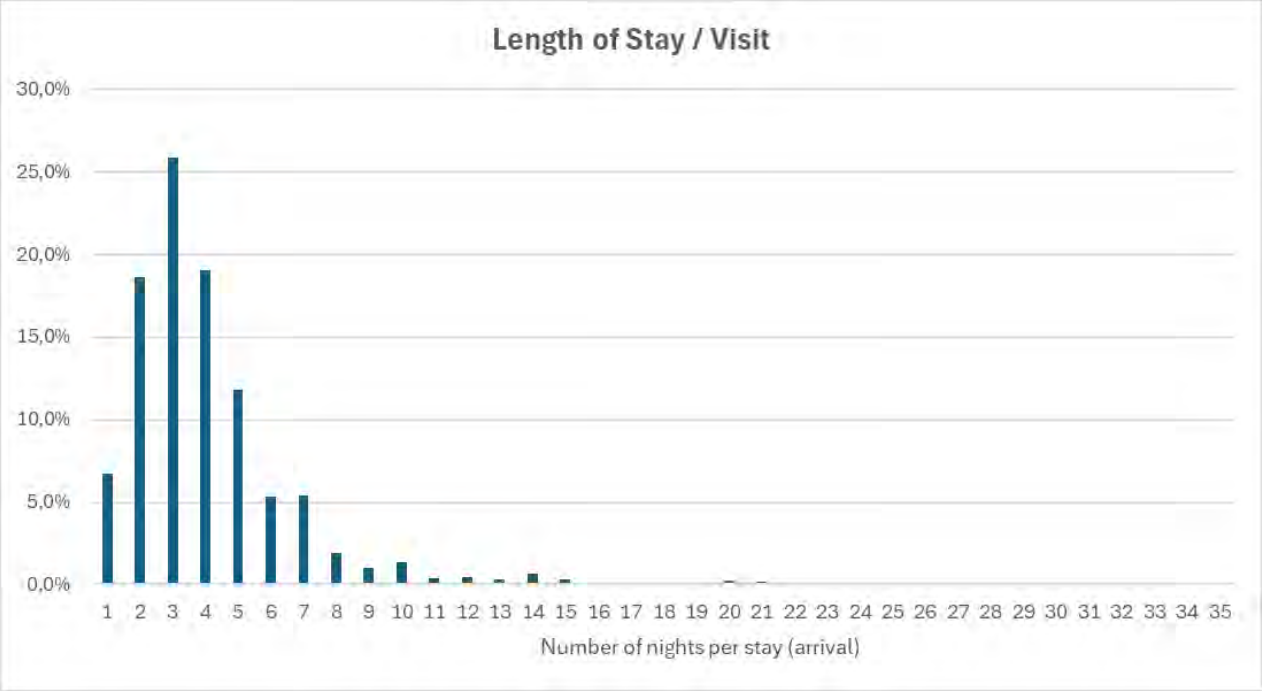
Vienna



Source: Statistik Austria
Sample: All commercial accommodation providers (compulsory)
Definition: All forms of paid accommodation incl. neighbouring areas
Market: Total foreign and domestic

Average Length of Stay (ALS) 2023: **2.287 nights**

Vienna survey data



Source: T-MONA
Sample: n = 14.466 (weighted)
Period: 01.11.2017 - 30.04.2024

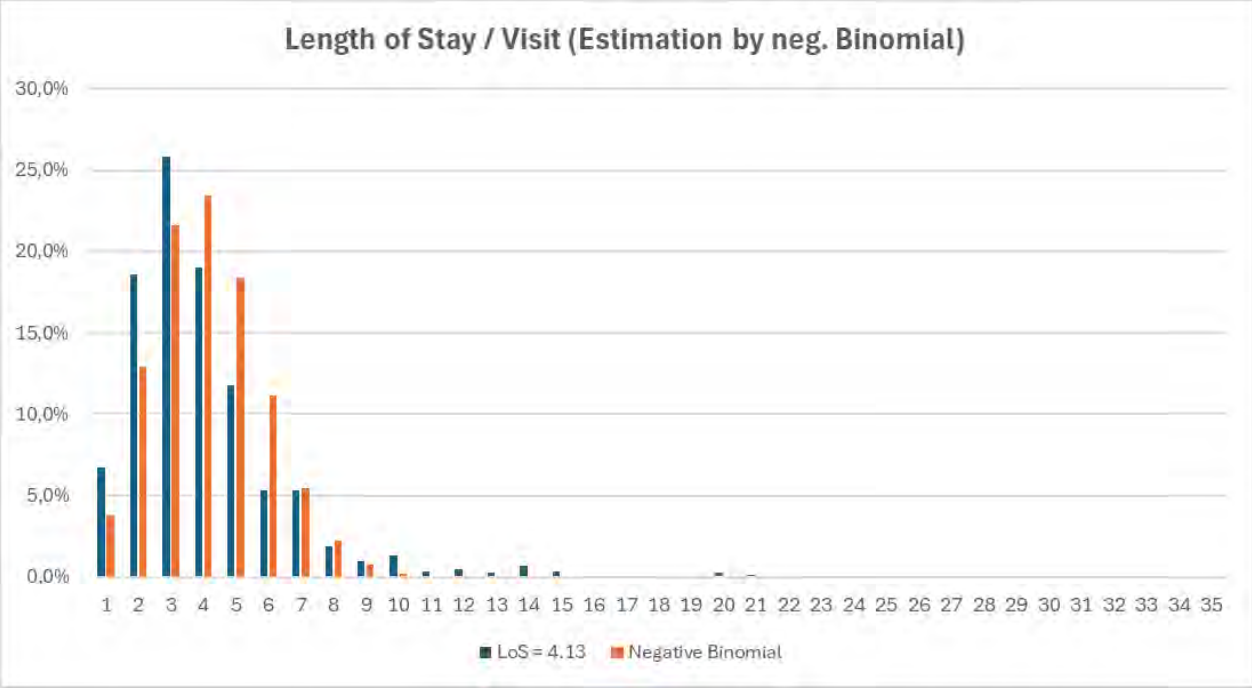
Average Length of Stay (ALS) 2017-2024: 4.129 nights

4.1 vs 2.3 nights!

Survey data **only includes leisure guests**!

Data collected from accommodation providers by the national statistical office includes all guests!

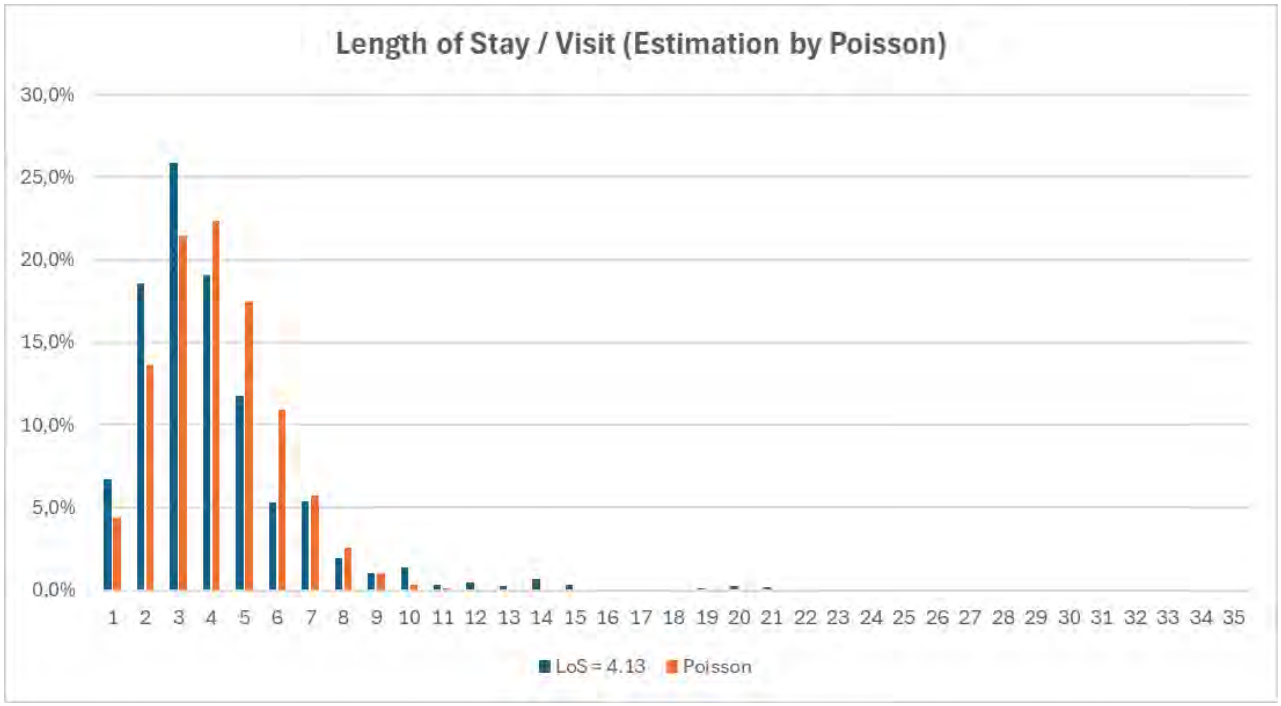
Vienna



Negative Binomial
N=35; p=0.092
Fit: MAPE < 1%

Average Length of Stay (ALS)
2023: 4.129 nights

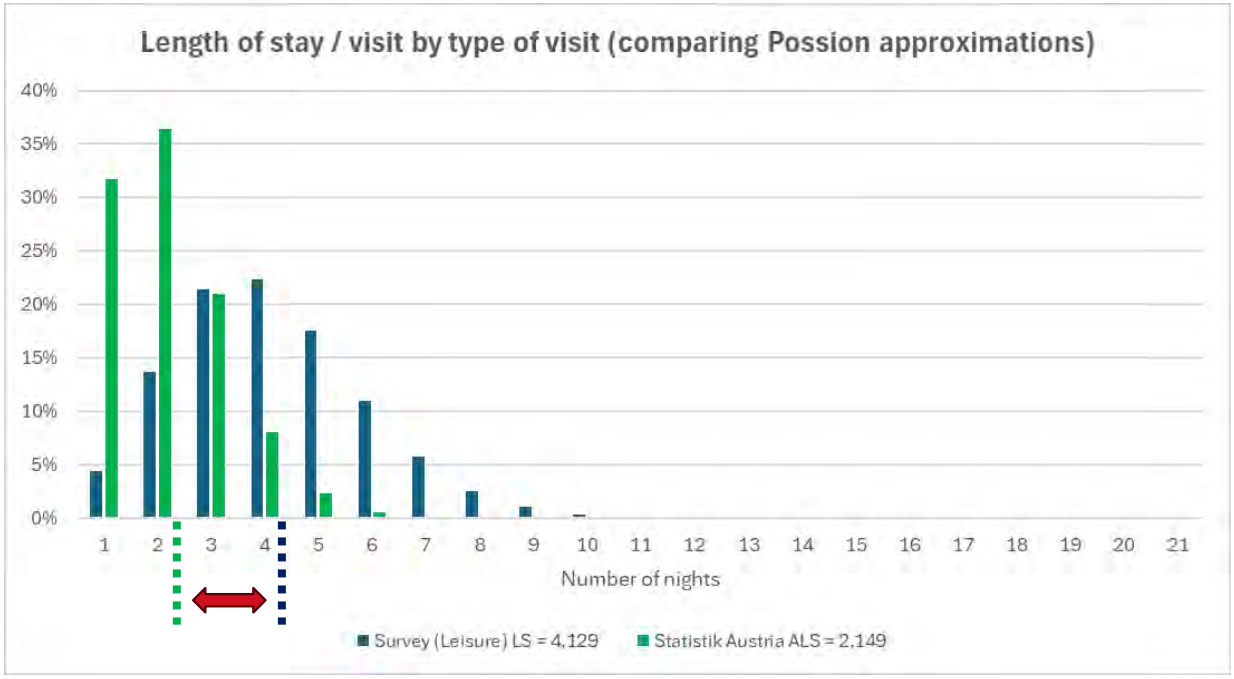
Vienna



Poisson
$\lambda = 4.129$
Fit: MAPE < 0.9%

Average Length of Stay (ALS)
2023: 4.129 nights

Estimating the Number of Business Travellers in Vienna



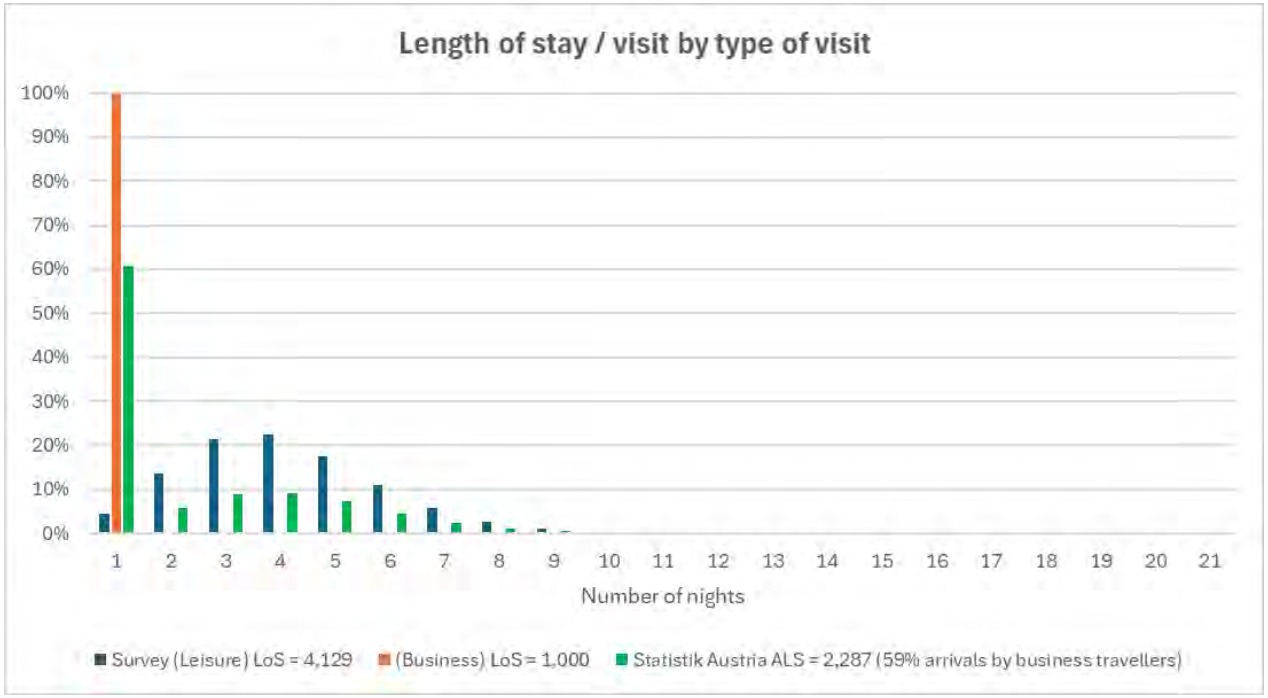
Survey data = leisure guests

Data from statistical office covers all guests

Other guests (business travellers) have clearly a lower ALS

Difference in ALS (1.842 nights) can help us to estimate the proportion of business travellers!

Assumption 1: All Business travellers in Vienna stay only 1 night



ALS of other guests (**business travellers**, orange): **1** night

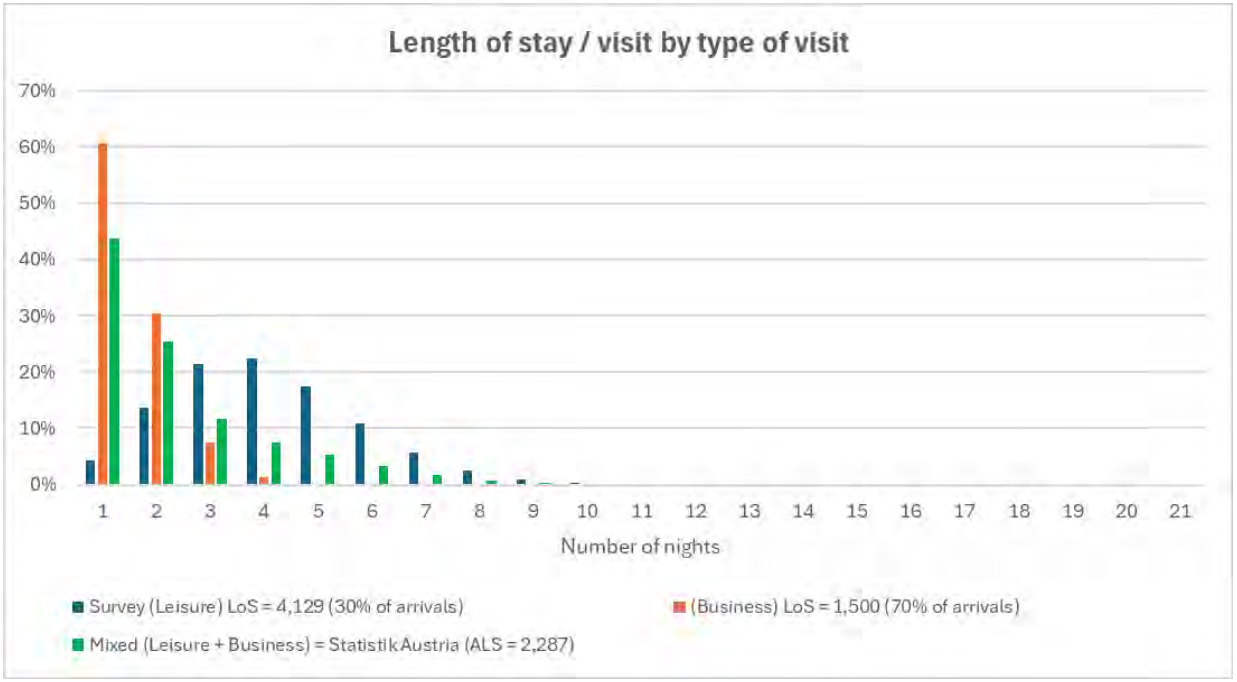
ALS of **leisure guests** (blue): **4.129** nights (reported by T-MONA)

ALS of **all** guests (green): **2.287** (reported by the Austrian statistical office)

This holds true when **59%** of all arrivals stem from business travellers and **41%** from leisure travellers

=> 59% is the minimum of travellers with a lower length of stay!

Assumption 2: All Business travellers in Vienna stay on average 1.5 nights (Poisson distributed)



The ALS of business travellers staying over night in Vienna must be between 1 and 2.287 nights

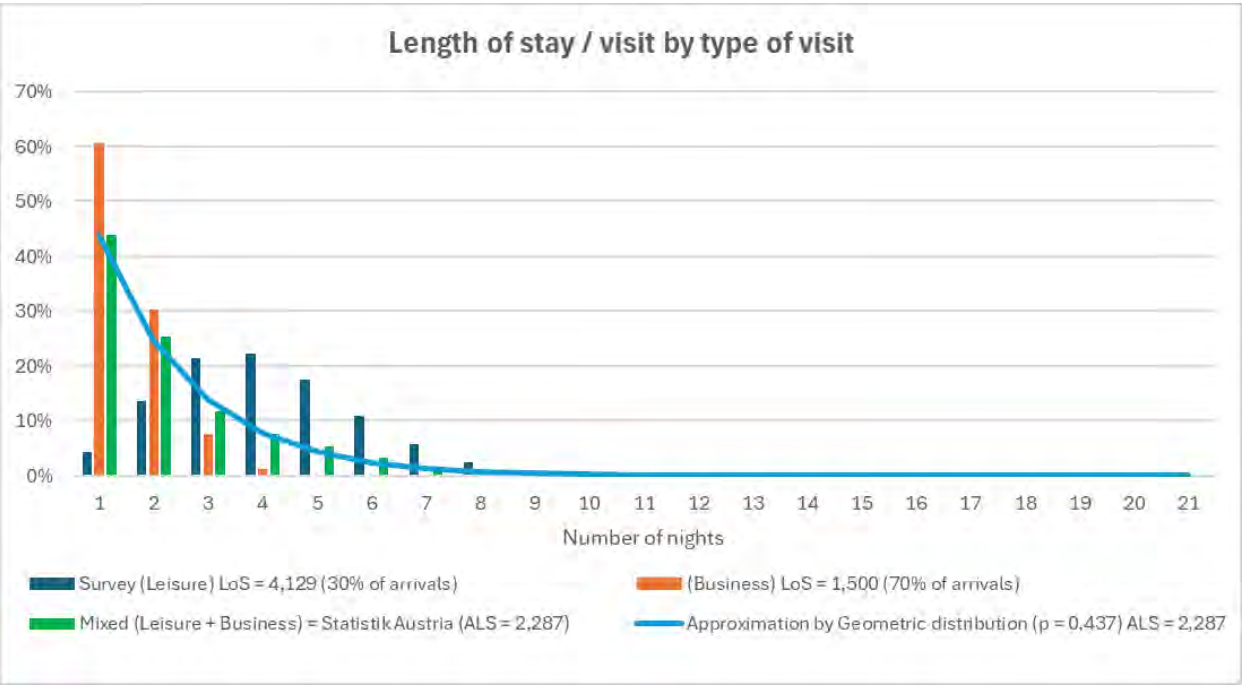
If the ALS is 2.287 nights then 100% are business travellers (unrealistic)

Realistic assumption: 1.5; Poisson distributed

ALS other/business: **1.5** night
ALS leisure: **4.129** nights
ALS all tourists: **2.287**

This holds true when **70%** of all arrivals are business travellers and **30%** are leisure travellers

Assumption 2: All Business travellers in Vienna stay on average 1.5 nights (Poisson distributed)



Mixed distribution of ALS is not following a bell shaped distribution

Geometric distribution (discrete negative exponential function) appears to provide a good fit and should be used for estimating the ALS for Vienna

-> TourMIS (www.tourmis.info)

Summary

- More sustainable, time-dependent, tourism tax models will require a better understanding of the distribution of the length of stay of tourists
- The length of stay is heavily dependent on the sample selection. Research that does not take sample selection into account is inadequate
- Geometric distribution appears to provide a good fit for estimating the length of stay per number of days (for Vienna)
- Comparing data from different samples can provide valuable additional insights in the differences between sample populations

In 2025, a new table has been added that makes it possible to estimate the length of stay per day and to compare this data with estimates from guest surveys (Table ETC-J23 and CityDNA-23)

1000 | 0,0% | Visual Graph

Cities - Nights and arrivals - Annual data
CityDNA-J23: in days per stay (estimated)

Destination: Vienna
Information: All forms of paid accommodation incl. neighbouring areas
Days: Total foreign and domestic
Period: 2024 (Arrivals = 8,748,509, Bednights = 19,815,346, ALS = 2.265)

Length of stay per stay

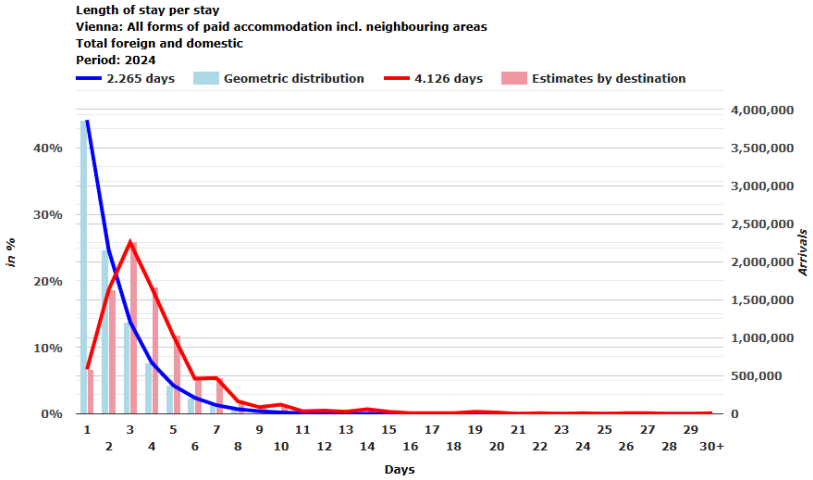
	Poisson function				Estimates by destination				
Days	Arrivals	in %	Bednights	in %	Arrivals	in %	Bednights	in %	Diff (2)
1	2,469,181	28.2	2,469,181	12.5	587,900	6.7	587,900	1.6	21.5
2	3,123,506	35.7	6,247,012	31.5	1,625,473	18.6	3,250,946	9.0	17.1
3	1,975,613	22.6	5,926,838	29.9	2,260,615	25.8	6,781,844	18.8	3.3
4	833,048	9.5	3,332,192	16.8	1,665,716	19.0	6,662,864	18.5	9.5
5	263,451	3.0	1,317,254	6.6	1,028,825	11.8	5,144,123	14.2	8.7
6	66,653	0.8	399,917	2.0	465,421	5.3	2,792,524	7.7	4.6
7	14,053	0.2	98,368	0.5	468,920	5.4	3,282,441	9.1	5.2
8	2,540	0.0	20,316	0.1	167,097	1.9	1,336,772	3.7	1.9
9	402	0.0	3,614	0.0	87,485	1.0	787,366	2.2	1.0
10	56	0.0	564	0.0	118,980	1.4	1,189,797	3.3	1.4
11	7	0.0	79	0.0	31,495	0.4	346,441	1.0	0.4
12	1	0.0	10	0.0	39,368	0.5	472,419	1.3	0.4
13	0	0.0	1	0.0	25,371	0.3	329,819	0.9	0.3
14	0	0.0	0	0.0	58,615	0.7	820,610	2.3	0.7
15	0	0.0	0	0.0	27,995	0.3	419,928	1.2	0.3
16	0	0.0	0	0.0	6,124	0.1	97,983	0.3	0.1
17	0	0.0	0	0.0	5,249	0.1	89,235	0.2	0.1
18	0	0.0	0	0.0	7,874	0.1	141,726	0.4	0.1
19	0	0.0	0	0.0	22,746	0.3	432,176	1.2	0.3
20	0	0.0	0	0.0	13,998	0.2	279,952	0.8	0.2
21	0	0.0	0	0.0	875	0.0	18,372	0.1	0.0
22	0	0.0	0	0.0	4,374	0.1	96,234	0.3	0.1
23	0	0.0	0	0.0	1,750	0.0	40,243	0.1	0.0
24	0	0.0	0	0.0	6,999	0.1	167,971	0.5	0.1
25	0	0.0	0	0.0	875	0.0	21,871	0.1	0.0
26	0	0.0	0	0.0	5,249	0.1	136,477	0.4	0.1
27	0	0.0	0	0.0	6,999	0.1	188,968	0.5	0.1
28	0	0.0	0	0.0	0	0.0	0	0.0	0.0
29	0	0.0	0	0.0	875	0.0	25,371	0.1	0.0
30+	0	0.0	0	0.0	5,249	0.1	157,473	0.4	0.1
Total (1)	8,748,509	100.0	19,815,346	100.0	8,748,509	100.0	36,099,846	100.0	77.3
Average length of stay		2.265				4.126			1.861

(1) Rounding error may occur
(2) Difference between estimates provided by the destination and the selected function (Arrivals in %)

Table: CityDNA-J23 (tab_j23)

Estimate the distribution of arrivals and bednights per number of days a tourist is staying at your destination

+ compare your statistical ALS with your ALS from your guest survey!



An option to enter length of stay information from surveys has been included.

Data entry>>Main indicators

- Availability of data/definitions (Data Input Timetable)
- Latest available figures
- Annual and/or monthly bednights or arrivals
- MS Excel interface for uploading bednights or arrivals
- Annual capacities and occupancy rates
- Size of a destination and geo-data
- Population numbers
- Mode of transportation and circular tour information
- Daily spending per overnight tourist
- Tourist tax
- Length of stay per stay

Vienna [VIE] Return

Market

Information

Period

Days *	Arrivals in %
1	6,72 %
2	18,58 %
3	25,84 %
4	19,04 %
5	11,76 %
6	5,32 %
7	5,36 %
8	1,91 %
9	1,00 %
10	1,36 %
11	0,36 %
12	0,45 %
13	0,29 %
14	0,67 %
15	0,32 %
16	0,07 %
17	0,06 %
18	0,09 %
19	0,26 %
20	0,16 %
21	0,01 %
22	0,05 %
23	0,02 %
24	0,08 %
25	0,01 %
26	0,06 %

(5) Sustainability indicators (NRC)

Nine sustainability indicators

European Countries >> Annual data reports >> Annual data

For one destination

	1 or 2 year(s)	Trend
Nights and arrivals	for various markets	for a market
	for various markets and benchmark	for a market and benchmark
		for all definitions
Length of stay	for various markets	for on market and several years
	in nights per stay (estimated)	
Sustainability	transportation-caused CO2	transportation-caused CO2
	Sustainability indicators	

	DOMAINS	INDICATOR	UNIT (Format of the output)	CALCULATION METHODS
SOCIAL	Pressure	Number of beds per 100 residents	Number of beds per 100 residents	$\text{Number of Beds per 100 Residents} = \left(\frac{\text{Number of Beds}}{\text{Population}}\right) \times 100$
		Tourism Intensity	Number of tourist overnight stays per 100 residents per day	$\text{Tourist Intensity per 100 Residents per Day} = \frac{\text{Number of Overnight Stays}}{\text{Number of Residents} \times 365} \times 100$
		Tourism density	Number of tourist overnight stays per day per km2	$\text{Tourism Density} = \frac{\left(\frac{\text{Number of overnight stays}}{365}\right)}{\text{Area in km}^2}$
ECONOMIC	Regional Dispersion	Bednights in top 5 destinations	% of a countries total bednights that are spent in the top 5 destinations	$\text{Proportion of Overnight Stays in Top 5 Destinations} = \left(\frac{\text{Number of nights spent during the year for top 5 destinations}}{\text{Number of nights spent during the year for the entire country}}\right) \times 100$
	Tourism Growth	Yoy % growth in bednights	% Change	$\text{YoY \% Growth} = \left(\frac{\text{Current year overnight stays} - \text{Previous year overnight stays}}{\text{Previous year overnight stays}}\right) \times 100\%$
		Yoy % growth in foreign bednights		
		Yoy % growth in domestic bednights		
	Seasonality	Seasonality Rate	Gini coefficient (0;1)	$\text{GUK} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}\lvert x_i - x_j\rvert}{2n\sum_{i=1}^{n} x_i}$
	Economic Benefits	Average length of stay of tourists per arrival	Length of stay per arrival at an accommodation establishment	$\text{Average Length of Stay per Arrival} = \frac{\text{Total Overnight Stays}}{\text{Total Arrivals}}$

(6) Density & intensity (NC)

Density & intensity

In tourism statistics, tourism density and tourism intensity are related but measure two different dimensions of tourism pressure:

Indicator	Typical formula	What it measures
Tourism density	Tourist nights ÷ area (km^2)	Spatial concentration of tourism
Tourism intensity	Tourist nights ÷ resident population	Tourism relative to the size of the local population

Both are useful for measuring tourism pressure, but they capture fundamentally different things: **density is destination-space oriented**; **intensity is resident oriented**.

Density & intensity

Cities >> Annual data reports >> Annual data

For one destination

	1 or 2 year(s)	Trend
Nights and arrivals	for various markets	for a market
	for various markets and benchmark	for a market and benchmark
		for all definitions
Length of stay	for various markets	for one market and several years
	in nights per stay (estimated)	
Sustainability	transportation-caused CO2	transportation-caused CO2
	Sustainability indicators	

For one market

	1 or 2 year(s)	Trend
Nights and arrivals	in all cities	in all cities
Length of stay	in all cities	
Daily spending	in all cities	
Density & intensity	in all cities	for a city and benchmark

(7) Capacities and occupancy (NC)

Capacities and occupancy

Cities - Annual data reports - Annual data
ECM-J5: Accommodations, bedspaces and occupancy

Information: All forms of paid accommodation in city area only
Period: 2025

		Capacities					Occupancy	
		Accomm. units	Beds		Bednights			
	(1)	absolute	absolute	% p.y.	absolute	% p.y.	(a)	(b)
Aachen	A		5,858	5.7	1,124,732	4.1		53.3
Antwerp	A	79	14,777	3.9	3,213,721	16.5	70.6	60.4
Augsburg	A		6,690	-3.5	1,158,604	-3.2		48.1
Berlin	A	701	143,152	-2.1	29,442,693	-3.8	55.5	57.1
Bonn	A		10,134	-1.8	1,607,886	-2.0		44.1
Bregenz	A	2,088	36,239	609.7	386,669	1.4		3.0
Bruges	A	740	14,282	3.4	2,001,237	-0.7		38.9
Cologne	A	257	38,865	2.9	7,222,166	1.9	50.8	51.6
Dresden	A	176	25,897	-0.6	4,577,379	-1.2	48.0	49.1
Dubrovnik	A	17,979	48,786	2.2	4,281,540	0.2	24.1	24.4
Düsseldorf	A		37,942	0.8	5,675,218	2.3		41.5
Eisenstadt	A	44	884	-3.6	69,902	11.5		22.0
Florence	A	19,257	131,731	5.1	11,521,949	11.1		24.3
Geneva	A	10,806	19,180	-3.2			55.1	
Granada	A		15,209	5.6	3,433,253	3.3		62.7
Graz	A	276	10,571	10.2	1,465,754	5.2		38.5
Hamburg	A	418	80,993	3.1	16,455,337	2.1	56.0	56.4
Hannover	A		17,637	2.2	2,483,005	4.3		39.1
Helsinki	A	81	26,235	0.9	4,912,762	7.9	50.6	52.0
Innsbruck	A	285	9,821	0.2	1,969,865	3.9		55.7
Istanbul	A		168,210	6.1	40,105,289	26.8		66.2
Klagenfurt	A	258	6,782	1.0	514,501	3.5		21.1
Las Palmas	A		6,695	2.1	1,449,350	-3.0		60.1
Liepaja	A	41	1,902	-4.2	206,461	-4.6	30.6	30.2
Linz	A	128	6,904	0.8	1,034,077	1.2		41.6
Lisbon	A	660	75,734	2.5	15,968,994	1.7		58.6
Malaga	A	197	17,808	7.8	3,740,465	7.6	90.4	58.3
Münster	A		10,113	1.6	1,910,412	0.4		52.5
Nuremberg	A	150	22,602	1.2	3,867,553	-0.0	47.0	47.5
Oulu	A	13	3,037	-0.5	607,234	-2.2		55.5
Padua	A		13,259	8.1	1,737,063	-1.6		36.4
Prague	A	831	95,700	0.5	18,993,211	3.9		55.1
Regensburg	A		8,548	-1.6	1,360,754	-0.3		44.2
Rijeka	A		9,284	-2.2	611,513	2.5		18.3
Salzburg (city)	A	231	17,775	5.2	3,288,513	4.8		51.4
Santiago de Compostela	A		6,709	-1.5	1,528,872	-4.4		63.3
St. Pölten	A	43	2,206	10.5	238,336	2.9		30.0
Stockholm	A	195	50,506	7.2	10,191,896	4.7	54.8	56.1
Stuttgart	A	164	24,305	-0.7			47.0	
Venice	A		70,241	7.2	9,376,638	-0.6		37.1
Verona	A		32,820	15.5	3,300,780	6.4		27.9
Vicenza	A		5,942	7.6	547,329	-4.1		25.6
Warsaw	A	225	45,509	8.0	8,728,750	8.8		53.3
Würzburg	A		6,154	1.5	1,100,832	2.6		49.7

A = All forms of paid accommodation in city area only
AS = All forms of paid accommodation incl. neighbouring areas
G = Hotels and similar establishments in city area only
GS = Hotels and similar establishments incl. neighbouring areas

(a) = Information of the respective statistical office (in %).
(b) = Calculated in % of total bed capacity in 360 days.

Special reports

Capacities & Other

Portfolio Analysis	All markets versus all cities (arrivals or nights)
Comparison of the diversity of the guest mix	Closest airports
Accommodations, bedspaces and occupancy	Tourist tax

Statistical occupancy definitions:
1 year = 360 days
= average annual occupancy

Note: Average size of accommodation providers (e.g. beds per accommodation unit) is missing

(8) Attractions and sights (NC)

(9) Portfolio analysis (NC)

A Common Problem In Marketing

To find the right (optimal) mix of target markets

Implications for strategic (long-term) decisions and for the budget allocation process (e.g. where should we invest?)

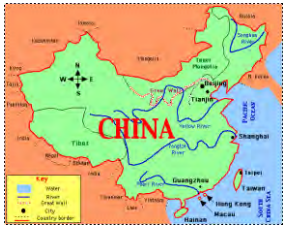
Two basic questions from a DMO's perspective:

- **Attractivity** of a market?
- What are the **chances of my tourism destination** in attracting visitors from a particular market?

Portfolio Analysis

What makes a market attractive?

1. Size/volume



e.g. Germany, China, …

2. Growth/Prospects

e.g. Middle East, Brazil,…

Measured by market volume and market growth indicators

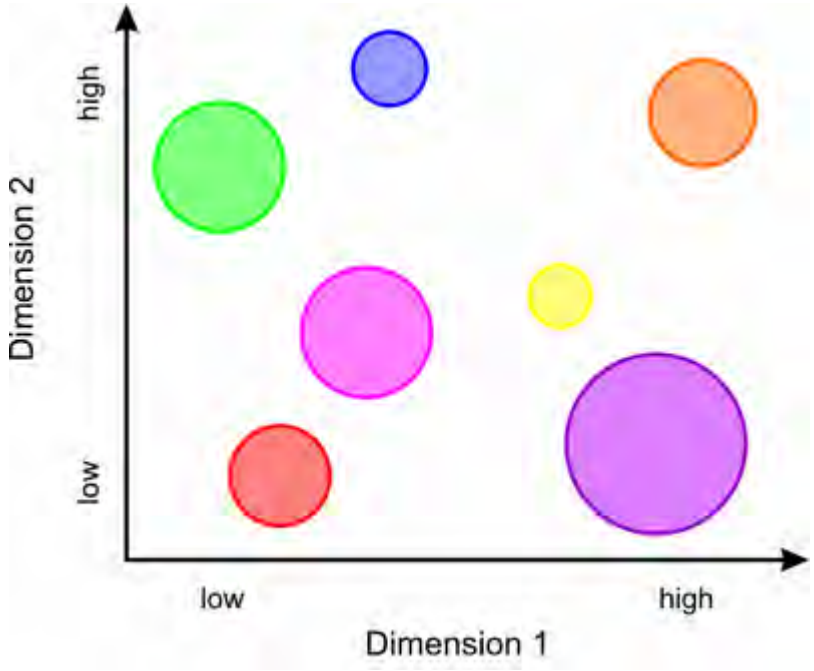
- # of travellers/arrivals/bednights or spendings
- either measured at the country of origin (source market) or in all destinations (e.g. total bednights in all destinations)

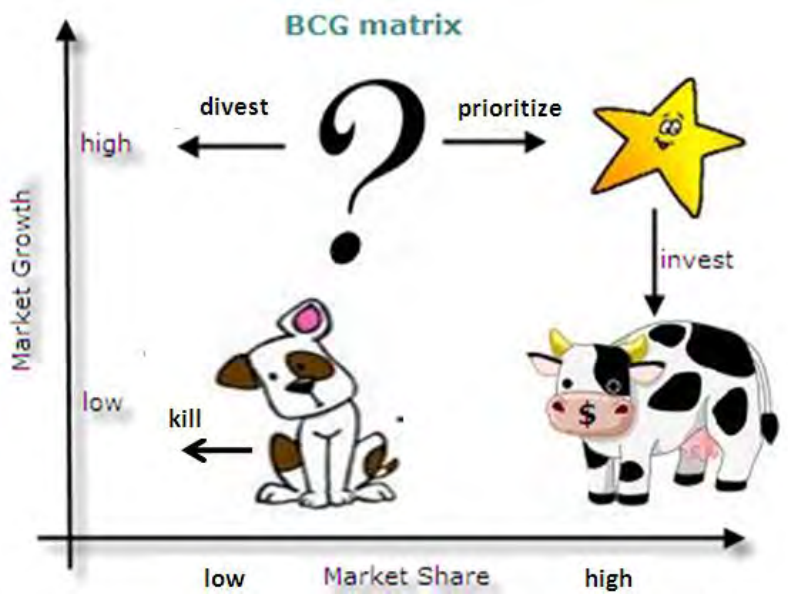
Portfolio Analysis

Strategic Key Performance Indicators

- Absolute market share is the ratio when comparing the performance of a particular destination with the overall market volume (in %)
- Relative market share is the ratio of the market share of a particular destination compared to the market share of the leading destination (or the second best destination if the destination of evaluation is the market leader)
- Guest mix share (= importance value) is the proportion of bednights sold of a particular market compared to the overall number of bednights recorded in a tourism destination (in %)

Visualization by the Market growth-share matrix

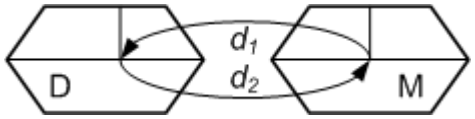




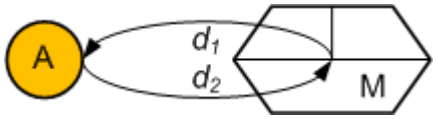
(10) Estimating CO2 emissions caused by tourism transportation (NC)

Objectives and motivation

- **Stefan Gössling, Daniel Scott, Michael Hall 2015**: *Inter-market variability in CO2 emission-intensities in tourism: Implications for destination marketing and carbon management*, Tourism Management, 46, pp. 203-212
- CO2 emissions in tourism calculated based on the distances flown of all tourists from a specific **source market** to a specific **destination** times CO2 emission factors per flight distance



- The primary objective of the TourMIS project is to create **more precise estimates** of CO2 emissions of European **city tourism**

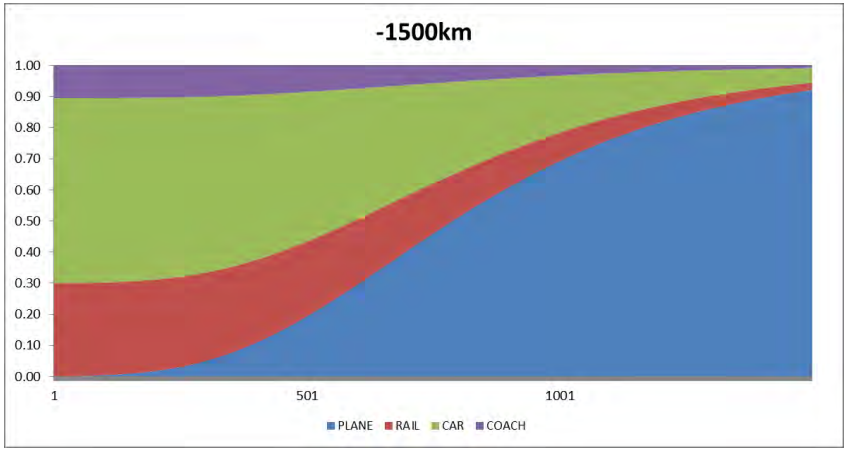


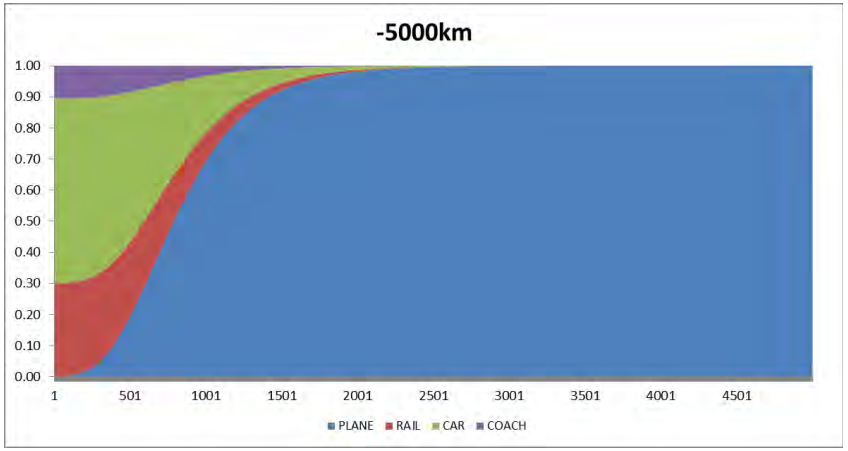
- In order to achieve this objective, **not only the travel distance** (as typically done) but also the **chosen transportation mode(s)** and the particularities of the different cities' **source markets** are taken into account

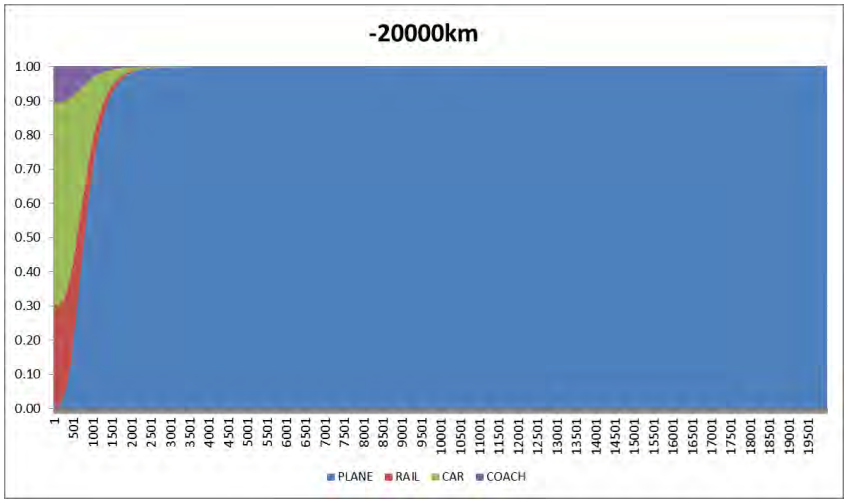
4 Steps

1. Calculation of travel distances in km between European cities and their source markets based on their geographical coordinates (population centers) as reported by the Socioeconomic Data and Applications Center (SEDAC) by NASA
2. Estimation of travel mode (… Brussels, Simon Detemmerman)
3. Calculation of CO2 emissions by multiplying distance by travel mode with average CO2 emissions by travel mode
4. Incorporating multiple trips and average length of stay

Estimating travel distance by travel mode







The probability of choosing a certain transportation mode is approximated by a Gompertz function in travel distance (PLANE) and a growth function in travel distance (RAIL), with the remaining probability (i.e., 100% – Pr(PLANE) – Pr(RAIL)) being distributed on CAR (85%) and COACH (15%), respectively

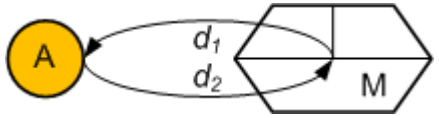
Estimating CO2 emissions

- Travel distances per transportation mode are calculated by multiplying the travel distance in km per destination and source market by Pr(PLANE), Pr(RAIL), Pr(CAR), and Pr(COACH), respectively
- CO2 emissions per tourist arrival are calculated by multiplying the travel distances per transportation mode by the average CO2 emissions per transportation mode according to Peeters et al. (2007):

Table 11.2 Emission factors for tourism transport modes in the EU context

Mode	CO_2 factor (kg/pkm)	Occupancy rate/load factor (%)
Air < 500 km	0.206	–
500-1,000 km	0.154	–
1,000-1,500 km	0.130	–
1,500-2,000 km	0.121	–
> 2,000 km	0.111	–
Air world average [a]	0.129	75
Rail	0.027	60
Car	0.133	50
Coach	0.022	90

(a) This value is calculated in Section 11.1.2.1.
Source: Peeters, P. et al. (2007b)



$$CO_2 = \sum f^T(d_1) * kg/pkm^T + \sum f^T(d_2) * kg/pkm^T$$

In 2024 a new table has been added that makes it possible to track the development of transport-related CO2 emissions over a period of several years and to compare the trend with other European countries in the TourMIS database (Table ETC-J17).

European Countries - Nights and arrivals - Annual data
ETC-J17: transportation-caused CO2

Destination: Austria (47.516, 14.550)
Arrivals in all forms of paid accommodation
Benchmark: All European Countries
Mode of transport: Estimate by TourMIS
Number of other
visited destinations: = 1 (no roundtrips)
Domestic: Yes
Period: 2018-2023

		All European Countries				Austria				in %		
Period	Number	Arrivals	(1)	CO2 kg/pP	Total CO2 t	Arrivals	(1)	CO2 kg/pP	Total CO2 t	Arrivals	Total CO2	TDI
2018	14	473,189,434	0.6	188	89,432,256	44,848,762	2.7	235	10,558,850	9.5	11.8	1.2
2019	20	667,334,332	0.6	233	155,631,834	46,195,388	2.6	239	11,063,356	6.9	7.1	1.0
2020	19	271,629,365	0.4	89	24,313,808	25,030,207	1.3	118	2,973,534	9.2	12.2	1.3
2021	19	317,392,832	0.4	89	28,497,421	22,144,098	1.3	100	2,228,670	7.0	7.8	1.1
2022	19	502,406,078	0.6	162	81,494,303	39,794,088	2.0	154	6,137,278	7.9	7.5	1.0
2023	19	558,364,922	0.7	207	115,593,985	45,212,567	2.7	189	8,587,353	8.1	7.4	0.9

(1) Unspecified in %
Travel distance indicator (TDI): <1 = local; 1 = average; >1 = far
CO2 emissions (Peeters et al. 2007):
Air: <500 km: 0.206 kg/pkm; 500-1,000 km: 0.154 kg/pkm; >1,000-1,500 km: 0.130 kg/pkm;
>1,500-2,000 km: 0.121 kg/pkm; >2,000 km: 0.111 kg/pkm
Rail: 0.027 kg/pkm; Car: 0.133 kg/pkm; Coach: 0.022 kg/pkm

Table: ETC-J17 (tab_j17)

Compare your CO2 performance year by year!

(11) Meetings industry (C)

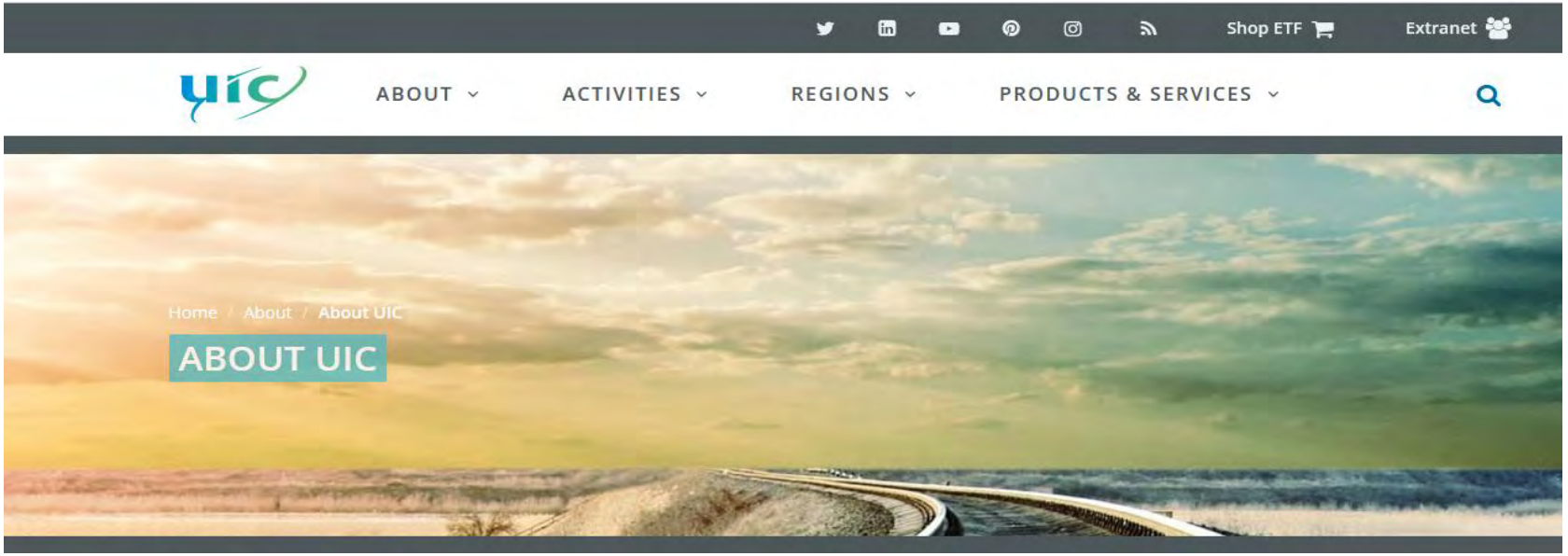
(12) Closest airports (C)

Source: https://ourairports.com/

(13) Rail connections (C)

Travel by Rail

- Measuring the tourism share of rail travel is difficult
- Replacement: Measurement of connectivity - quality of rail connections between tourism destinations and major markets in Europe
- International Union of Railways - MERITS database



The Connectivity of Railroads in Europe

- Acquisition of the MERITS database (all 2021 timetables) by CityDNA
- Review of the data material (completeness, information content)
- Data uploaded to TourMIS
- Aim: Analysis of direct connections between the most important European cities
  - Direct and indirect connections between (CityDNA) cities
  - Number of (international) trains
  - Average speed
- Reporting in the latest edition

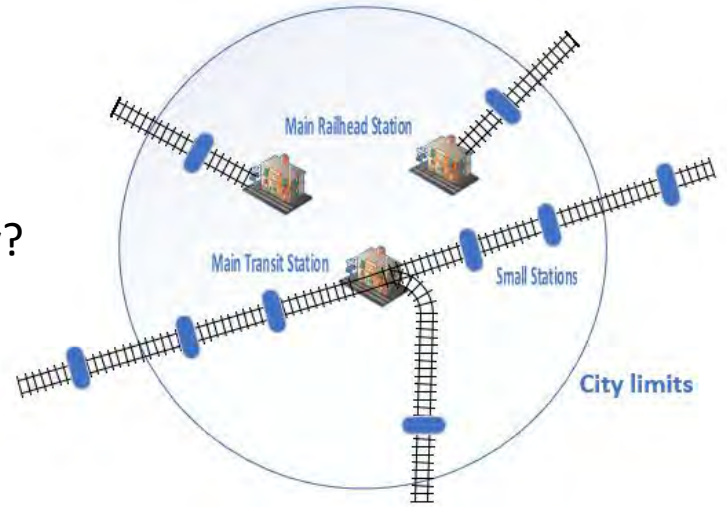
  of the **City Travel Report** by CityDNA

The MERITS Database 2021

Big and complex data set

- Number of railway companies: 1,534
  - **195** (12.7%) **providers of passenger services**
- Number of trains: 639,389
- Number of departures: 8.7mn
- Number of stations: 24,001

- Which station belong to a particular city?
- Main train stations?



Seven reports in TourMIS

1. List of stations
2. Information on specific trains
3. Stations in cities
4. Arriving and departing trains by stations
5. Arriving and departing trains by city
6. Direct connections between cities
7. Direct connections between cities and markets

White paper (Manual) on who to use and interpret the Merits database on TourMIS

II. NEW Database on Regional Tourism Statistics

Network of European Regions
for Sustainable and
Competitive Tourism

APIs used by TourMIS

1. Netherlands - https://opendata.cbs.nl
2. Norway - https://data.ssb.no
3. Estonia - https://andmed.stat.ee
4. Finland - https://visitfinland.stat.fi
5. Denmark - https://api.statbank.dk
6. Switzerland - https://www.pxweb.bfs.admin.ch/pxweb/de/
7. Slovenia - Podatkovna baza SiStat
8. Spain - work in progress
9. Belgium - semi-automatic (full API planned)
10. Austria - semi-automatic (full API planned)
11. Italy (planned)
12. Sweden (planned)
13. Portugal (eventually)

- Update checks scheduled two times a week
- Adjustments during the updating process are possible (e.g. Estimation of monthly data based on quarterly data; calculation of the larger urban area by adding data from different municipalities; calculating all paid forms of accommodation suppliers)

Regional Tourism Statistics (Sep 2026)

#	Country	Regions	From	Until	AA	NA	AG	NG
1	**Austria**	9	1986	2026	1	1	1	1
2	**Belgium**	13	2003	2026	1	1	1	1
3	**Denmark**	16	1992	2026		1		1
4	**Estonia**	21	2022	2026	1	1		
5	**Finland**	19	1995	2026	1	1		
6	**Latvia**	37	2022	2026	1	1		
7	**Norway**	81	2021	2026	1	1	1	1
8	**Slovenia**	8	2021	2026	1	1		
9	**Spain**	71		2025			1	1
10	**Switzerland**	191	2013	2026			1	1
		466			**7**	**8**	**5**	**6**

AA = Arrivals in all forms of accommodation establishments
NA = Nights in all forms of accommodation establishments
AG = Arrivals in hotels and similar forms of accommodation
NG = Nights in hotels and similar forms of accommodation

NUTS (*Nomenclature of Territorial Units for Statistics*)

EU's hierarchical system for dividing countries into comparable territorial units. It is maintained by Eurostat and is particularly useful for TourMIS because it gives a standardized way of coding countries, regions, provinces, and similar destinations across Europe.

Level	Meaning	Typical population	Austria example	Spain example
Country	Member State	—	AT – Austria	ES – Spain
NUTS 1	Major socio-economic regions	3–7 million	AT1 – Ostösterreich	ES5 – Este
NUTS 2	Basic regions for regional policy	0.8–3 million	AT13 – Wien	ES51 – Cataluña
NUTS 3	Small regions for detailed analysis	150,000–800,000	AT130 – Wien	ES511 – Barcelona

The Austrian *Bundesländer* are therefore **NUTS 2**. Below them, NUTS 3 divides Austria into smaller groups of districts. Vienna is unusual because **AT13 (NUTS 2) and AT130 (NUTS 3)** cover essentially the same territory.

Spain:

NUTS 1 = groups of Autonomous Communities
NUTS 2 = generally **Autonomous Communities**
NUTS 3 = generally **provinces**

There are exceptions, particularly the autonomous cities **Ceuta and Melilla.**

LAU (*Local Administrative Units*)

Smaller administrative units are classified by LAU. LAU covers municipalities/communes and is particularly relevant when a TourMIS destination is a city rather than a region, although some cities may be included in NUTS.

NUTS and LAU are statistical, not tourism classification systems. This distinction matters for TourMIS:

A tourism destination does not necessarily correspond to a NUTS or LAU region!

Destination	**Appropriate geographical concept**
Austria	Country
Tirol	NUTS 2
Barcelona Province	NUTS 3
Barcelona city	LAU
Vienna	NUTS 2 / NUTS 3 / LAU coincide geographically to a large extent
Salzkammergut	**no direct NUTS equivalent**
Costa del Sol	**no direct NUTS equivalent**

Tourism regions frequently cross NUTS boundaries or consist of parts of NUTS regions.

The TourMIS type describes the destination, not the statistical level!

Regions

Denmark

1. Copenhagen City
2. Copenhagen Region
3. Province Nordsjælland
4. Province Bornholm
5. Province Østsjælland
6. Province Vest- og Sydsjælland
7. Province Fyn
8. Province Sydjylland
9. Province Østjylland
10. Province Vestjylland
11. Province Nordjylland
12. Nordjylland
13. Midtjylland
14. Syddanmark
15. Hovedstaden
16. Sjælland

Estonia

1. Harju county
2. Harju county, excl. Tallinn
3. Hiiu county
4. Ida-Viru county
5. Järva county
6. Jõgeva county
7. Lääne county
8. Lääne-Viru county
9. Pärnu city as a settlement unit
10. Pärnu county
11. Pärnu county, excl. Pärnu city
12. Põlva county
13. Rapla county
14. Saare county
15. Tartu city as a settlement unit
16. Tartu county
17. Tartu county, excl. Tartu city
18. Valga county
19. Viljandi county
20. Võru county
21. Tallinn

Regions Norway

1. Rogaland
2. Stavangerregion
3. Haugesund/Haugeland
4. Ryfylke
5. Møre og Romsdal
6. Nordmøre/Romsdal
7. Ålesund/Sunnmøre
8. Nordland - Nordlánnda
9. Bodø
10. Vesterålen/Narvik
11. Helgeland
12. Salten-region
13. Lofoten
14. Svalbard
15. Svalbard
16. Haldenkanalen
17. Mosseregion
18. Sarpsborg
19. Fredrikstad/Hvaler
20. Drammensregion
21. Kongsbergregion
22. Follo
23. Asker/Bærum
24. Hallingdal
25. Østfold
26. Akershus
27. Romerike/Hadeland
28. Buskerud
29. Norefjell/Ringerike
30. Innlandet
31. Hedmark-region
32. Lillehammer-region
33. Gjøvikregion
34. Ringsaker
35. Trysil
36. Østerdalen
37. Nord-Gudbrandsdal
38. Valdres
39. Hortenregion
40. Tønsbergregion
41. Sandefjord/Larvik
42. Grenland
43. Øst-Telemark
44. Midt-Telemark
45. Vest-Telemark
46. Vestfold
47. Telemark
48. Agder
49. Risør/Tvedestrand
50. Arendal/Grimstad
51. Kristiansandregion
52. Lindesnes/Lyngdal
53. Vestre-Agder
54. Setesdal
55. Vestland
56. Bergensregion
57. Fjordkysten
58. Sunnhordland
59. Hardangerfjord
60. Voss
61. Sognefjord
62. Sunnfjord
63. Nordfjord
64. Trøndelag - Tröödelage
65. Innherred
66. Namdalen
67. Hitra/Frøya
68. Fosenregion
69. Oppdal
70. Rørosregion
71. Orkdalsområdet
72. Værnesregion
73. Sør-Troms/Senja-region
74. Nord-Troms-region
75. Vest-/Indre-Finnmark
76. Øst-Finnmark
77. Troms - Romsa - Tromssa
78. Finnmark -Finnmárku - Finmarkku
79. Oslo
80. Trondheim
81. Tromsø

Regions

Finland

1. Uusimaa
2. Southwest Finland
3. Satakunta
4. Kanta-Häme
5. Pirkanmaa
6. Päijät-Häme
7. Kymenlaakso
8. South Karelia
9. South Savo
10. North Savo
11. North Karelia
12. Central Finland
13. South Ostrobothnia
14. Ostrobothnia
15. Central Ostrobothnia
16. North Ostrobothnia
17. Kainuu
18. Lapland
19. Åland

Belgium

1. Province of Antwerp
2. Province of Eastern-Flanders
3. Province of Flemish-Brabant
4. Flemish Region
5. Province of Hainaut
6. Province of Liege
7. Province of Limburg
8. Province of Luxemburg
9. Province of Namur
10. Walloon Region
11. Province of Brabant-Wallon
12. Province of West-Flanders
13. Brussels

Austria

1. Burgenland
2. Carinthia
3. Lower Austria
4. Upper Austria
5. Salzburg
6. Styria
7. Tirol
8. Vorarlberg
9. Vienna

New: Availability of data/definitions

Regions >> Availability of data/definitions

all regions for each European country in TourMIS

all markets in TourMIS

Table

Regions
REG-94: all regions for each European country in TourMIS

1 AUSTRIA

				Data (1)			Preferred definition (2)			Size and population (3)			
#	Code	Destination	Country	Points	Inputters	API	Nights	Arrivals	Capacities	Size (km²)	Population (Year)	RGB	Map
1/1	BU	Burgenland	Austria	59,430		✓				3,965.0		☐	◎
2/2	KA	Carinthia	Austria	71,746		✓				9,537.0		☐	◎
3/3	NI	Lower Austria	Austria	68,864		✓				19,180.0		☐	◎
4/4	SA	Salzburg	Austria	75,306		✓				7,155.0		☐	◎
5/5	ST	Styria	Austria	73,071		✓				16,400.0		☐	◎
6/6	TI	Tirol	Austria	74,300		✓				12,648.0		☐	◎
7/7	OB	Upper Austria	Austria	74,174		✓				2,602.0		☐	◎
8/8	WI	Vienna	Austria	46,185		✓				415.0		☐	◎
9/9	VO	Vorarlberg	Austria	66,796		✓				2,602.0		☐	◎

2 BELGIUM

				Data (1)			Preferred definition (2)			Size and population (3)			
#	Code	Destination	Country	Points	Inputters	API	Nights	Arrivals	Capacities	Size (km²)	Population (Year)	RGB	Map
1/10	BRU	Brussels	Belgium	5,901			A	A	A	162.4	1,219,970 (2021)	■	◎
2/11	BEFLR	Flemish Region	Belgium	4,312								☐	◎
3/12	BEANR	Province of Antwerp	Belgium	852								☐	
4/13	BEWBR	Province of Brabant-Wallon	Belgium	852								☐	
5/14	BEEFL	Province of Eastern-Flanders	Belgium	852								☐	
6/15	BEFBR	Province of Flemish-Brabant	Belgium	852								☐	
7/16	BEHAI	Province of Hainaut	Belgium	852								☐	
8/17	BELIE	Province of Liege	Belgium	852								☐	

New: Six data entry options ‘Main indicators’

Data entry>>Main indicators

- Availability of data/definitions (Data Input Timetable)
- Size of a destination and geo-data
- Population numbers
- Mode of transportation and circular tour information
- Daily spending per overnight tourist
- Length of stay per stay

III. New: Daily spending per overnight tourist (NRC)

Sharing expenditure data from visitor surveys

1. Monitoring and comparing the **daily expenditures** of all tourists and individual markets
2. Focus: Average daily expenditures of tourists (excluding transportation to the destination) broken down by
    - accommodation
    - food and beverages
    - entertainment
    - shopping
    - other
3. Meta-data: Sample size, standard deviation or standard error of average daily expenditure
4. Survey year (adjustments by inflation)
5. Support for all European currencies (exchange rates from European central bank in Frankfurt)

Daily expenditure

If we know tourists' average daily expenditure, we already have the key ingredient for estimating the direct economic impact of tourism. The basic calculation is:

Tourist expenditure =
Number of visitor nights × Average daily expenditure per tourist

For example, if Vienna records 20 million tourist nights and the average overnight visitor spends €220 per day:

$$20{,}000{,}000 \times €220 = €4.4 \text{ billion}$$

This €4.4 billion is the **gross direct visitor expenditure**, but it is not yet the same as tourism's contribution to GDP or regional value added.

Tourist expenditure ≠ Tourism expenditure

Tourism expenditure = overnight stays × spending per overnight visitor-day + day visitors × spending per day visitor

Measure	What it means	How to calculate
Direct tourist expenditure	Money tourists spend in the destination	Nights × expenditure/day
Direct value added	Income generated locally after deducting intermediate inputs	Expenditure × value-added ratio
Total economic impact	Direct + indirect + induced effects	Direct expenditure/value added × appropriate multiplier

Data entry and first table

Average daily spending per overnight tourist in Vienna (VIE) 2025

Source T-MONA

Notes Sample for Vienna

Currency EUR 1,000000000 exchange rate **Sample size** 2512 Last edit: 2026-08-28 10:29:00 by sebfer

	Market	Currency	Average daily spending	thereof					Delete
				Accommodation	Food & Beverages	Shopping	Entertainment	Other	
1	Total foreign and domestic	EUR	286,00					286,00	☐
		EUR	286,00					286,00	
+		EUR							
		EUR							

Copy Survey | 2024 << | >> 2026 | Save | Delete | Return

For one market

	1 or 2 year(s)	Trend
Nights and arrivals	in all cities	in all cities
Length of stay	in all cities	
Daily spending	in all cities	

Market Total foreign and domestic

Year 2025 Table

1000 0,0%

Cities - Annual data reports - Annual data
CityDNA-J30: in all cities

Information: Daily spending per overnight tourist (in EUR)
Market: Total foreign and domestic
Period: 2025

#	Destination	Average daily spending	thereof Accommodation	Food & Beverages	Shopping	Entertainment	Other	Sample size	Source	Notes
230	Vienna	286.00					286.00	2,512	T-MONA	(1)

Notes
(1) = Sample for Vienna

Table: CityDNA-J30 (tab_j30)

IV. New: Tourist tax collected by accommodation providers (C)

Tourist tax

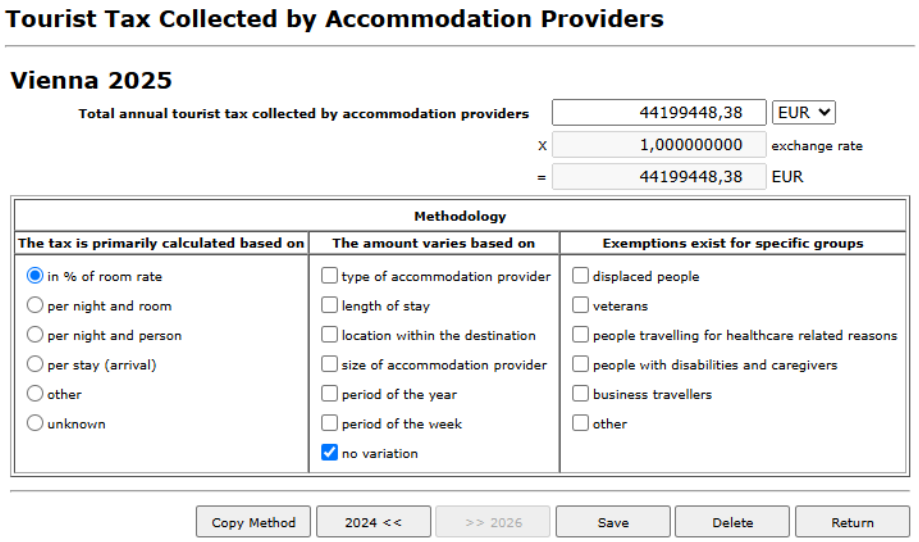
"Tourism taxes of many EU member states have been designed with regulatory intentions to either regulate or differentiate tourism flows" GROUP NAO

COUNTRY	TAX BASE	SELECT LOCAL TAX RATES	NOTES
Austria	Per person, per night	€0.50 - €3.80	*Vienna has a 3.2% room rate.*
Belgium	Often per person, per night	€1.25 - €4	
Bulgaria	Per person, per night	€0.21 - €0.77	
Croatia	Per person, per night	€0.94 - €2.68	*The high rate is Dubrovnik (from 2021). Local government decide whether to tax cruise passengers.*
Cyprus	No occupancy tax	-	
Czech Republic	Per person, per night	€0.59 - €0.83	
Denmark	No occupancy tax	-	
Estonia	No occupancy tax	-	
Finland	No occupancy tax	-	
France	Per person, per night	€0.20 - €4.10	*"Palace status" hotels in Paris have 5€ rate*
Germany	Per person, per night, or based on cost of room	€1 - €3.80 or 5-7,5% on the room rate	*Hamburg charges progressively depending on room price. Some destination include VAT in tax. No levies in Munich.*
Greece	Per room, per night	€0.50 - €4	
Hungary	Per person, per night, or based on cost of room	4% of room rate or up to €1.60 per person/night	
Ireland	No occupancy tax		
Italy	Per person, per night and tax on island day trippers	€0.28 - €7 pr. night	*National legislation limits max rate to €5 except in some destinations such as Florence, Rome and Venice where it is €10*
Latvia	No occupancy tax	-	
Lithuania	Per person, per night	€0.60 - €1	
Luxembourg	No occupancy tax	-	
Malta	Per person, per night	€ 0.50	
Netherlands	Per person, per night, fixed rate percentage, or combo of both	€2.75-€5.73 or 6-6.5% of room rate or 7%+€3	*Amsterdam also charges cruise passenger and have implemented entertainment tax*
Norway	No occupancy tax	-	
Poland	Per person per night	€0.38 - €0.55	*Levied as climate fee which comprises a local fee or spa fee.*
Portugal	Per person per night	€1 - €2	
Romania	Room rate	€0.18 or up to 3%	
Slovakia	Per person, per night	€1.50 - €1.70	
Slovenia	Per person, per night, extra promotion fee tax	€1.60 - €3.13	*Occupancy tax capped at €2.50, but a 25% promotion fee is added on top*
Spain	Per person per night	€0.45 - €4	*Only tourism taxes in Catalonia + Balearic Islands*
Sweden	No occupancy tax	-	
Switzerland	Per person, per night	€2.05-4.00	*Varies with seasonality and visitors age.*
UK	No occupancy tax	-	*Legislation in Scotland to tax is postponed due to COVID*

Source: European Tourism Association (ETOA) 2020. Local tax span based on sampling of multiple destinations in each country.

Tourist tax can vary significantly

Destination / region	Tourist levy	Approx. burden
Bhutan	Sustainable Development Fee	**US$100 per person/night**
Amsterdam, Netherlands	Accommodation tourist tax	**up to 12.5% of accommodation price**
Barcelona, Spain	Catalan tourist tax + Barcelona municipal surcharge	potentially **€15+ per person/night** for luxury accommodation
Venice, Italy	Day-visitor access fee on designated dates	**€5–€10 per person/day**
Bali, Indonesia	International tourist levy	**IDR 150,000 (~€8) per visit**



Tourist tax: First table

Special reports

Capacities & Other	Portfolio Analysis	All markets versus all cities (arrivals or nights)
	Comparison of the diversity of the guest mix	Closest airports
	Accommodations, bedspaces and occupancy	Tourist tax

Information ○ Arrivals (preferred definition) ◉ Bednights (preferred definition)
Market ◉ Total foreign and domestic ○ Total foreign
Year 2025 Table

1000 0,0%

Cities - Annual data reports - Annual data
CityDNA-J25: Tourist tax

Information: Tourist Tax Collected by Accommodation Providers; Bednights (preferred definition)
Markets: Total foreign and domestic
Period: 2025

#	City	Tourist tax (EUR)	% p.y.	Def	Bednights	% p.y.	Tourist tax per night (EUR)	% p.y.	Methodology: The tax is primarily calculated based on	The amount varies based on [A]	[B]	[C]	[D]	[E]	[F]	[G]	Exemptions exist for specific groups [a]	[b]	[c]	[d]	[e]	[f]
1	Prague	38,426,689.00		NA	18,993,211	3.9	2.02		in % of room rate													
2	Vienna	44,199,448.38	6.2	NAS	20,974,848	5.9	2.11	0.3	in % of room rate							G						

Notes:
NA = Bednights in all forms of paid accommodation
NAS = Bednights in all forms of paid accommodation in greater city area
NG = Bednights in hotels and similar establishments
NGS = Bednights in hotels and similar establishments in greater city area
NZS = Bednights in all forms of accommodation incl. VFR in greater city area
The amount varies based on (Mult response question)
[A] = type of accommodation provider
[B] = length of stay
[C] = location within the destination
[D] = size of accommodation provider
[E] = period of the year
[F] = period of the week
[G] = no variation
Exemptions exist for specific groups (Mult response question)
[a] = displaced people
[b] = veterans
[c] = people travelling for healthcare related reasons
[d] = people with disabilities and caregivers
[e] = business travellers
[f] = other
* = **Method changed compared to last period**

Table: CityDNA-J25 (tab_j25)