

Tourism Supply and Demand in Gateway and Natural Amenity Region (GNAR) Communities

Gateway and Natural Amenity Region (GNAR) Research Network

Research Presentation | May 31, 2022

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How can communities effectively respond to continuously changing economic conditions?



Gateway Natural Amenity Region (GNAR) Communities

- Since the 1970s, economic restructuring from goods-producing to service-producing has had substantial ripple effects in the economy of small cities and towns (Sears & Reid, 1992)
- A **GNAR community** is a community with a **population between 150 and 25,000, within 10 miles of national parks and other protected and public areas, and more than 15 miles from urban areas** (Stoker et al., 2021)
- **Outdoor recreation-based tourism** has now become one of the main sectors **leading economic growth in southeastern GNAR communities in Utah** (Smith & Miller, 2020)



Source: The Gateway & Natural Amenity Region (GNAR) Initiative
(<https://www.youtube.com/watch?v=6gvBWcRiBmY>)

The Role of the Tourism Industry in GNAR Communities



- Tourism has a powerful potential to not only enhance local revenues but also diversify a community's economic base (Manzoor et al., 2019; Ruiz-Ballesteros & del Campo Tejedor, 2020)
- Visitors with diverse needs are increasingly coming to enjoy nature-friendly activities and cultural/historical experiences in GNAR communities (Mwesiumo et al., 2022)
- Understanding community resources that attract more visitors becomes a key for community resource management and development plans (Chen et al., 2016; Shen et al., 2020)



The Role of the Tourism Industry in GNAR Communities



- The Great American Outdoors Act was signed into law in 2020; attempts to improve access to national parks and other federal lands and advance infrastructure/facilities have accelerated to **protect resources while improving the quality of life for local residents and quality experiences for visitors**
- Smith and Miller (2020) found that the proportion of population employed in **tourism attraction-related sectors (arts/entertainment/recreation) and tourism service-related sectors (accommodation/food services) is larger in GNAR communities** than non-GNAR communities in Utah

Western GNAR communities

Have heightened **the need for the development of housing, transportation, and other public resources** as visitors and migrants have increased rapidly (Stoker et al., 2021)

Eastern GNAR communities

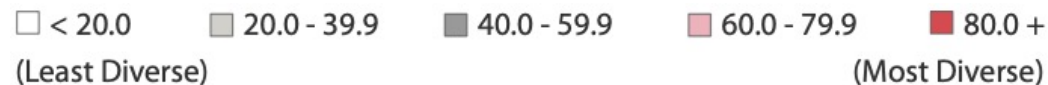
Have prioritized infrastructure, marketing, and education sector development, and as a result of investments, **tourism has reached a tipping point, recruiting new investments and residents and attracting more visitors** (Ezzell et al., 2021)

The Role of the Tourism Industry in GNAR Communities

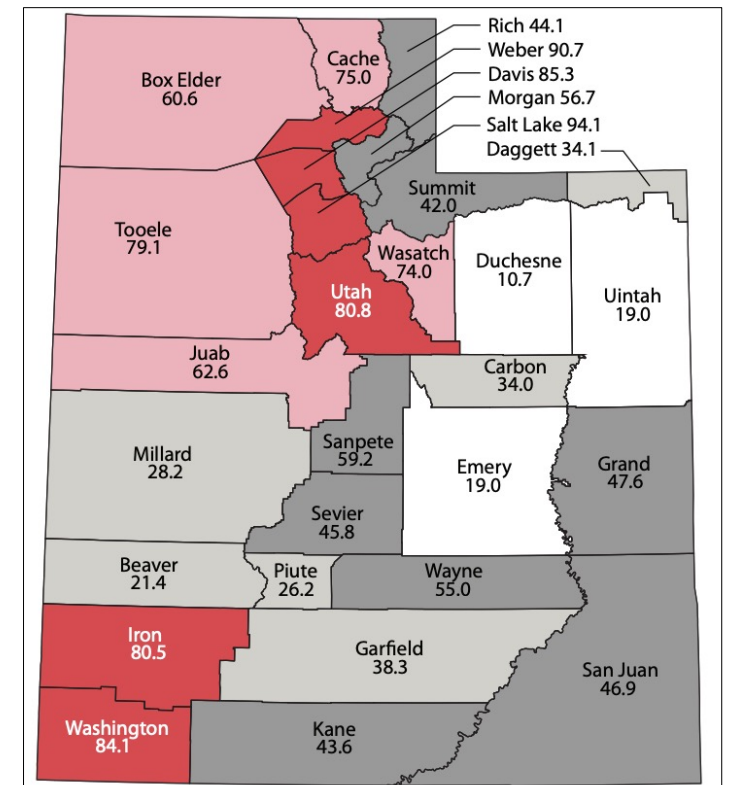


- GNAR communities have faced various community resource development and management challenges (Rumore et al., 2019) and **concerns related to providing quality tourism while conserving the environment** (Bennett et al., 2012; Howe et al., 2012)
- **Many GNAR communities are still in transition to shift from raw material production industries to tourism and related economic activities**

Hachman Index for Utah Counties in 2018



*The Hachman Index is a measure of the economic diversity of a region based on how closely the composition of industries matches that of a larger and well-diversified reference region



Tourism Supply-Demand Measurements



Prior studies have

- Focused mainly on the tourism supply and demand of large cities to **effectively manage and develop tourism resources and to predict future visitation**
- Measured **communities' tourism attractiveness** (Aubert et al., 2013; Formica & Uysal, 2006; Lovingood & Mitchell, 1989; Smith, 1987)
- Classified **the types of tourism** in communities (Spotts, 1995)
- Proposed a **tourism development potential index** (Chen et al., 2021)



Tourism Supply Measurements

Index or other measure	Author	Study area	Unit(N)	Elements
Efficiency and inefficiency indices of the tourism supply chain	Huang (2018)	30 regions in China	Province (30)	Tourism education/Hotels/Travel agencies/Tourist attractions
Tourism resource pattern indices	Kozak et al. (2008)	80 cities in Turkey	City (80)	Hotels, motel, and holiday villages/Food and beverage establishments/Number of employees in tourism industries/Festivals/Hostels, camp sites, and caravans/Historical places/Museums/Climate
Tourism dependency	Marcouiller & Prey (2005)	Wisconsin, U.S.	County (71)	Camp sites/State parks per capita/Amusement parks per square mile/Ski hills per capita/Water acreage per square mile/Public land per square mile
Regional analysis of tourism resources	Spotts (1995)	Michigan, U.S.	County (83)	Urban tourism resources/Parkland tourism resources/Canoeing/ORV riding tourism resources/Lake Michigan coastal tourism resources/General wildland tourism resources/General coastal tourism resources
Touristic attractiveness of a destination	Hu & Ritchie (1993)	Hawaii, Australia, Greece, France & China	State or country (5)	Scenery/Climate/Availability and quality of accommodations/Residents' attitudes toward tourists/Uniqueness of residents' lives/Historical attractions
Tourism indices	Lovingood & Mitchell (1989)	South Carolina, U.S.	County (46)	Hotels and hotel rooms/Restaurants/Campgrounds and campsites/Golf courses/Festivals/Villas/Boat ramps/Historical sites/State parks and natural sites/Population
Tourism resource indices	Smith (1987)	Ontario, Canada	County (47)	Outdoor recreation/Urban tourism/Cottaging/Boating/Urban fringe tourism

Tourism Demand Measurements

Index or other measure	Author	Study area	Unit(N)	Elements
Tourism demand energy and tourism attractiveness energy	Zhang et al. (2022)	Major theme parks in the U.S.	Theme park (170)	Review (TripAdvisor)
Visitation measures	Zhang et al., (2021)	Utah, U.S.	County (29)	Visitations (Flickr & Panoramio)
Visitation rates	Wood et al. (2013)	836 sites in 31 countries around the world	Photo-user-days (197 m.)	Visitations (Flickr)
The length of stay	Yang et al. (2011)	Yixing, China	Visitor (417)	Traveling distance/Age/Transportation/Motivation/Assessment of accommodation/Past visits
Tourism demand forecasting	Song et al. (2010)	Hong Kong	Tourist (23)	Tourist arrivals/Tourist expenditure
Multiple demand measures	Kozak et al. (2008)	80 cities in Turkey	City (80)	Average length of stay (nights spent by foreign and domestic visitors)/Occupancy rate for foreign visitors/The number of foreign visitor/The number of domestic visitors
Long-run and short-run tourism demand elasticities	Li et al. (2004)	22 Western European countries	Tourist (N/A)	Tourist expenditure

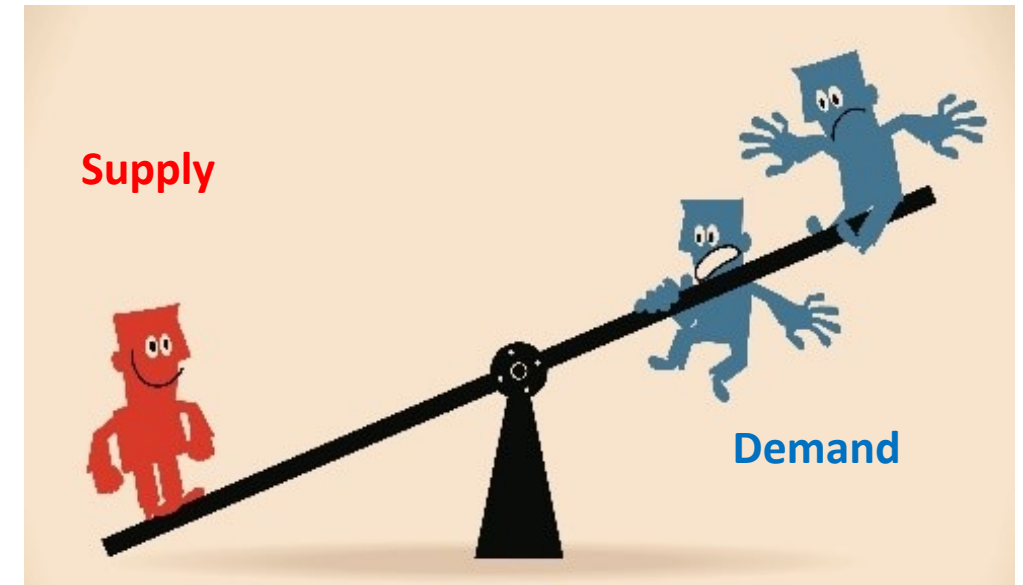
Tourism Supply-Demand Measurements

Index or other measure	Author	Study area	Unit(N)	Elements
Tourism development potential index	Chen et al. (2021)	Hainan (Belt and Road), China	Provincial administrative division (21)	<p>Supply: Direct and indirect supply and consumption/ Value of landscape resources and climate resources/Economic contribution/Employment contribution/Advanced tourism adaptability</p> <p>Demand: Demand potential/Purchasing potential</p>
Relationships between demand and potential supply	Yoshimura & Hiura (2017)	Hokkaido, Japan	Filtered geo-tagged photos (2,982)	<p>Supply: Naturalness/Water influence/Topography</p> <p>Demand: Visitations (Flickr)</p>
The touristic index	Aubert et al. (2013)	Hungary	Settlement (3,150)	<p>Supply: Attractions/Dominant tourism products/ Tourist information office/Accommodations</p> <p>Demand: Tourism tax</p>
Tourism attractiveness	Formica & Uysal (2006)	Virginia, U.S.	County (95)	<p>Supply: Tourism services and facilities/Cultural and historical/Rural lodging/Outdoor recreation</p> <p>Demand: The availability of attraction dimensions rating by 40 experts</p>

Problem Statement



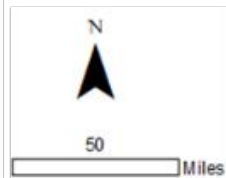
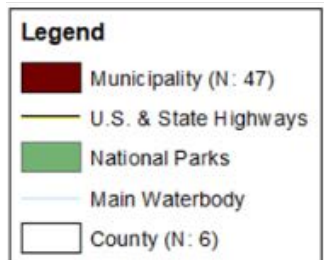
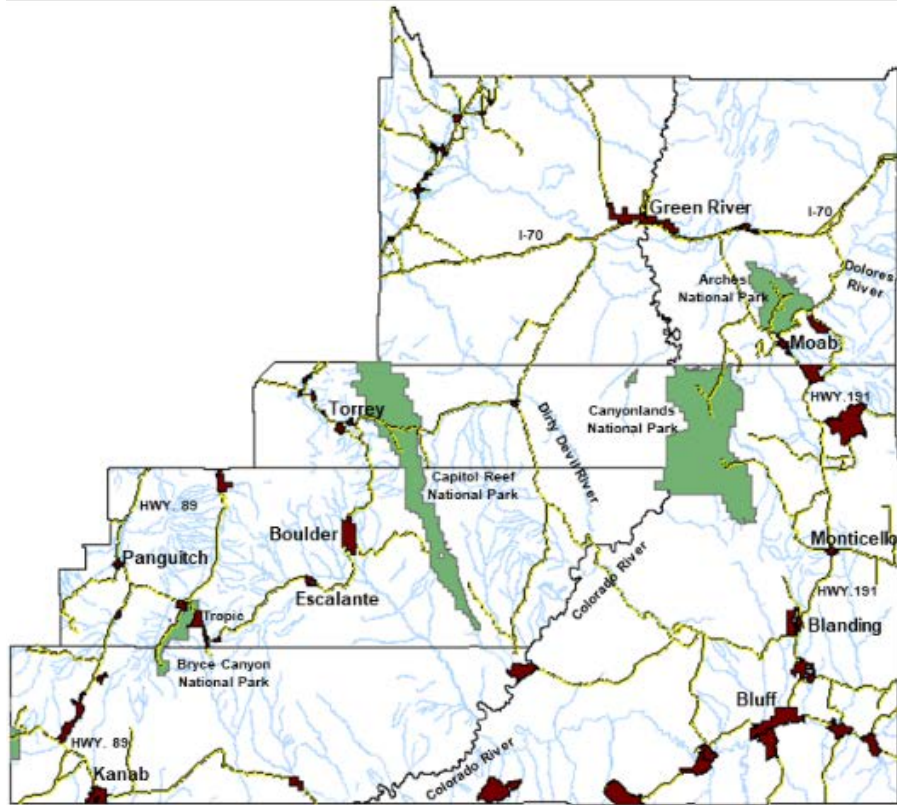
- Prior studies have focused mainly on the tourism supply and demand of urban communities or large cities (Formica & Uysal, 2006; Kirilenko et al., 2020; Zhu et al., 2018)
- Factors relating to tourism supply and demand in major metropolitan regions are different from indicators in small towns/cities like GNAR communities (Smith, 1990)
- An accurate diagnosis of tourism supply and demand for GNAR communities is necessary **to better understand what attracts visitors most and the balance between tourism supply and demand**



Research Outline



Study Area: 47 Municipalities in Utah



Objectives

1. Measure the relationships between tourism supply and demand across 47 municipalities in Utah
2. Provide an annual tourism visitation estimation model

Methods

- Unit of analysis:**
Municipality (47 municipalities in southeast Utah)
- Period:** 3 years (from 2019 to 2021)
- Variables:**
A total of 23 supply variables and 2 demand variables
- Analysis:** Ordinary least squares (OLS) regression
- Models:**
Cultural, economic, environmental, and infrastructural models

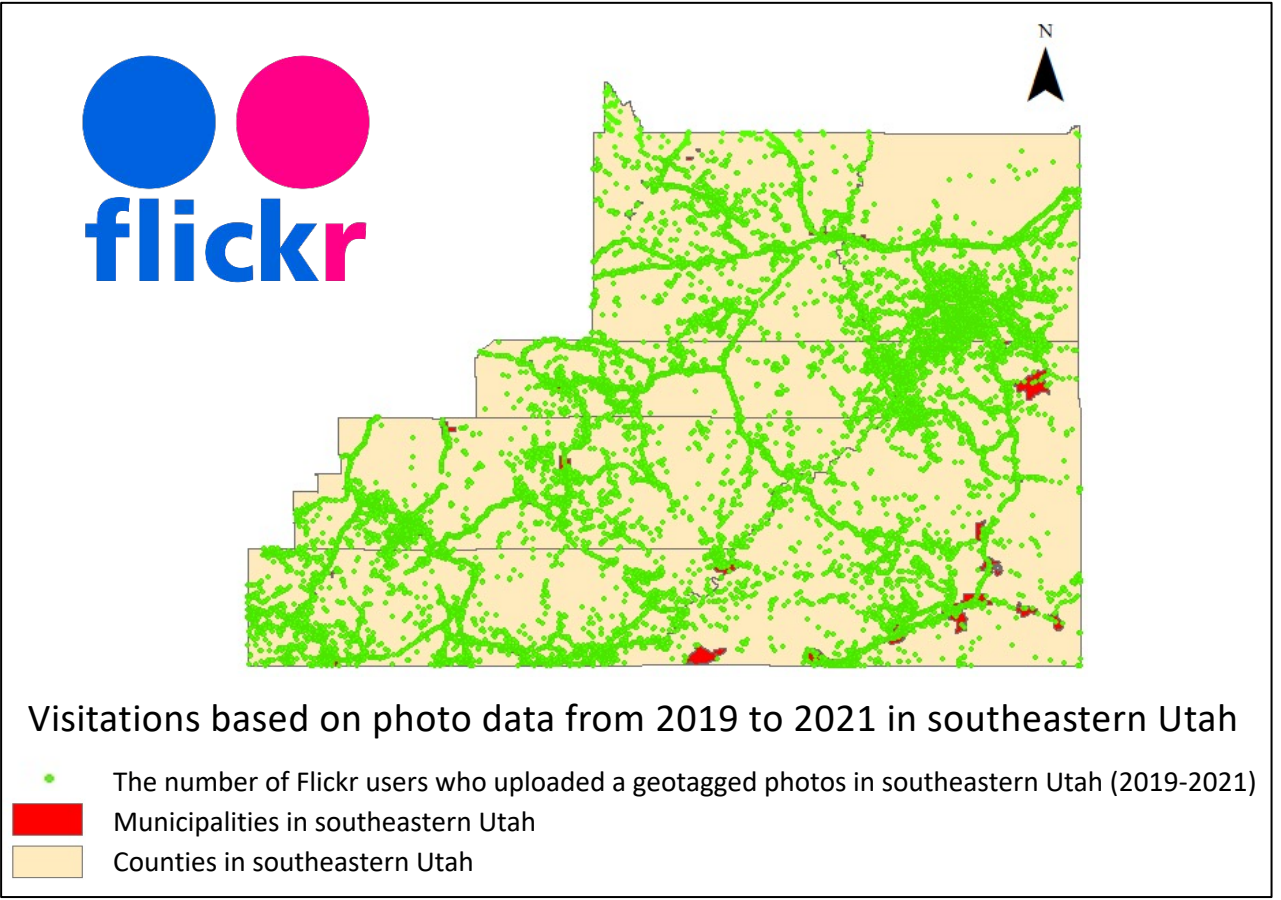
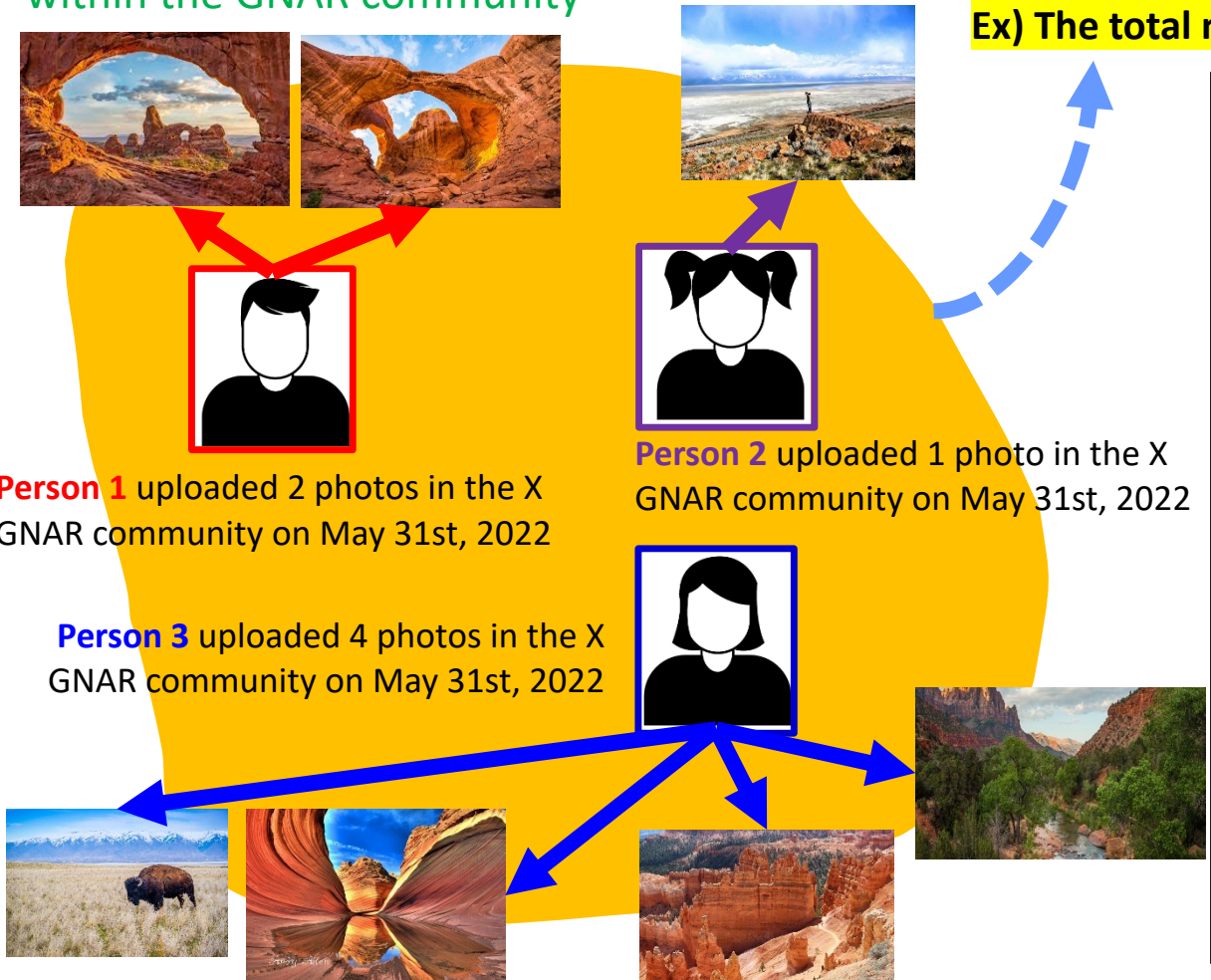
Tourism Supply Variable	Operational definition	Source	Year
Model 1: Cultural			
Historic districts	The area of historic districts	SGID	2021
Historic trails	The length of historic trails	SGID	2021
Historical monuments	The number of historical monuments	UGRC	2021
Viewpoints	The number of viewpoints	OSM	2021
Forest Service visitor centers	The number of Forest Service visitor centers	SGID	2020
Museums	The number of museums	OSM, DMO	2021
Model 2: Economic			
Hotels and motels	The number of hotels and motels	OSM, DMO	2021
Restaurants	The number of restaurants, cafes, fast foods, and pubs	OSM, DMO	2021
Residential areas	The number of residents	UGRC	2011
Model 3: Environmental			
Water body	The length of the water body	USGS, NHD	2020
Water body 10 mi.	The length of the water body intersects with municipalities' buffer of 10 mi.	USGS, NHD	2020
Water body 20 mi.	The length of the water body intersects with municipalities' buffer of 20 mi.	USGS, NHD	2020
Parks	The number of parks	PAD-US	2018
Distance to the closest national park	The road-based network distance from municipalities to the closest national park	NPS, PAD-US	2018
Distance to the closest public land	The road-based network distance from municipalities to the closest public land	BLM, PAD-US	2018
Model 4: Infrastructural			
Roads and highways	The length of roads and highways	UDOT	2021
Rail roads	The length of railroads	SGID	2021
Scenic byways	The length of scenic byways	UDOT	2021
Pathways	The length of trails and pathways	SGID	2021
Camp sites	The number of camp sites	OSM	2021
Golf courses	The area of golf courses	SGID	2016
Boat ramps	The number of boat ramps	SGID	2009
Healthcare facilities	The number of healthcare facilities	SGID	2017

Tourism Demand Variable

	Operational definition	Source	Year
Tourism demand			
Visitations based on mobile location data	Avg. number of visitors based on mobile location data from 2019 to 2021	Streetlight Data, Inc	2019~2021
Visitations based on photo data	Avg. number of photos uploaded in Flickr from 2019 to 2021	Flickr	2019~2021

Flickr data processing: All Flickr data were reduced to include only one photo, per user, per day (i.e., a photo-user-day [PUD]) within the GNAR community

Ex) The total number of visitations on May 31, 2022 is 3 in the X GNAR community



Tourism Visitation Prediction Model



- Build a tourism supply-demand model to fit tourism visitation (demand) to tourism resources (supply)
- Forecast tourism visitation for 47 municipalities in Utah

Assumption:

- Depending on the type of tourism resources, visitation varies across municipalities in Utah

Regression Model

$$\mathit{Visitation} = \beta_0 + \sum_1^i \beta_i \mathit{Tourism}_i + \varepsilon$$

- *Visitation* : the number of visitation
- β_i : the regression coefficient for $\mathit{Tourism}_i$
- $\mathit{Tourism}_i$: the tourism supply resource i (independent variable i)
- ε : the error term

Results - Cultural model



- Historic trails ($\beta=.244, p<.05$), viewpoints ($\beta=.447, p<.01$), and museums ($\beta=.334, p<.05$) had statistically significant impacts on visitations

Model Summary

Cultural Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.672	.452	.369	4.938

Coefficients

Cultural Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
Constant	.127	1.072		.119	.906	
Historic districts	.905	3.560	.033	.254	.801	1.238
Historic trails	.398	.194	.244	2.052	.047	1.035
Historical monuments	.907	.549	.227	1.652	.106	1.376
Viewpoints	13.633	3.691	.447	3.694	.001	1.070
Forest Service visitor centers	2.283	2.281	.124	1.001	.323	1.117
Museums	3.480	1.281	.334	2.717	.010	1.105

Results - Economic model



- Hotels and motels ($\beta=.652, p<.05$) had a statistically significant impact on visitations

Model Summary

Economic Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.792	.627	.601	3.925

Coefficients

Cultural Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics VIF
Constant	1.447	.701		2.066	.045	
Hotels and motels	.613	.287	.652	2.137	.038	10.754
Restaurants	.306	.318	.314	.963	.341	12.269
Residential areas	-.001	.001	-.222	-1.415	.164	2.840

Results - Revised economic model 1



- Hotels and motels ($\beta=.910, p<.001$) had a statistically significant impact on visitations

Model Summary

Economic Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.787	.619	.602	3.921

Coefficients

Cultural Model	Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics VIF
Constant	1.451	.700		2.072	.044	
Hotels and motels	.855	.138	.910	6.207	.000	2.486
Residential areas	-.001	.001	-.169	-1.150	.257	2.486

Results - Revised economic model 2



- Restaurants ($\beta=.910, p<.001$) had a statistically significant impact on visitations

Model Summary

Economic Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.767	.588	.569	4.081

Coefficients

Cultural Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics VIF
	B	Std. Error	Beta			
Constant	1.424	.728		1.955	.057	
Restaurants	.903	.159	.925	5.675	.000	2.836
Residential areas	-.001	.001	-.209	-1.283	.206	2.836

Results - Environmental model



- Water body ($\beta=.253, p<.05$), parks ($\beta=.618, p<.001$), and distance to the closest national park ($\beta=-.284, p<.05$) had statistically significant impacts on visitations

Model Summary

Cultural Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.748	.560	.493	4.425

Coefficients

Cultural Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
	B	Std. Error	Beta			VIF
Constant	3.904	2.225		1.755	.087	
Water body	.320	.138	.253	2.318	.026	1.085
Water body 10 mi.	.003	.007	.077	.379	.707	3.732
Water body 20 mi.	-.003	.002	-.312	-1.494	.143	3.957
Parks	2.308	.397	.618	5.819	.000	1.025
Distance to the closest national park	-.035	.015	-.284	-2.289	.027	1.395
Distance to the closest public land	.419	.208	.253	2.015	.051	1.427

Results - Infrastructural model



- Roads and highways ($\beta=.407, p<.05$), pathways ($\beta=-.410, p<.05$), healthcare facilities ($\beta=.407, p<.05$), camp sites ($\beta=.347, p<.05$), and scenic byways ($\beta=.349, p<.05$) had statistically significant impacts on visitations

Model Summary

Cultural Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.779	.606	.523	4.293

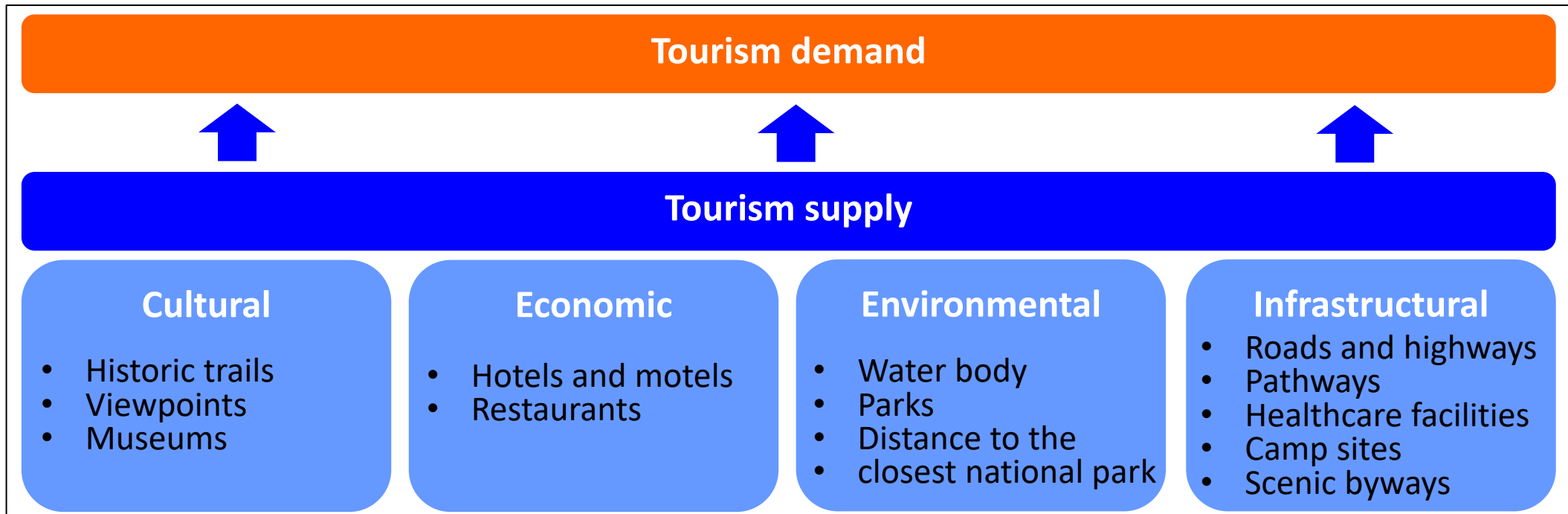
Coefficients

Cultural Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics VIF
Constant	-1.535	1.108		-1.386	.174	
Roads and highways	.077	.033	.407	2.343	.024	2.908
Pathways	-.258	.120	-.410	-2.150	.038	3.510
Healthcare facilities	1.231	.564	.407	2.184	.035	3.346
Camp sites	2.452	1.176	.347	2.086	.044	2.678
Boat ramps	.628	2.993	.028	.210	.835	1.779
Scenic byways	.469	.160	.349	2.924	.006	1.377
Golf courses	-13.634	9.784	-.163	-1.394	.172	1.319
Railroads	-.159	.209	-.100	-.760	.452	1.682

Conclusion



- Certain tourism supply measures are significantly and strongly associated with tourism demand across municipalities
- This exploratory study proposes four tourism demand estimation models based on potential tourism supply measures attracting visitation
- The findings can support GNAR community practitioners to effectively develop resource-based community development plans and policies based on tourism supply and demand



Future Steps



- A spatial approach needs to be applied in order to examine spatially varying relationships between tourism supply and demand across municipalities
- A seasonal estimation model should be developed to reflect seasonality



Thank you

Q&A



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