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Analysis and empirical study on the influencing factors of the tourism economy in Hunan Province

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Abstract

Tourism is a key driver of regional economic development and a foundational sector for national economic growth. Understanding the factors influencing the tourism industry is crucial for policy and investment decisions. This study examines the determinants of tourism revenue in Hunan Province, China, from 2003 to 2019. Using factor and regression analysis, the study investigates the impact of nine independent variables: rail and road travel distances, civil air passenger traffic, total number of tourists, art performance groups, GDP, urban and rural disposable income, and food and beverage consumption. All nine factors positively correlate with Hunan's tourism revenue, indicating that economic and infrastructural variables significantly influence tourism industry growth. Strengthening tourism infrastructure, enhancing investment channels, and supporting supply-side reforms are essential for sustained growth. Regional collaboration and innovation should be prioritized to drive long-term industry development. Policymakers should focus on expanding tourism consumption capacity, improving connectivity, and fostering an innovation-driven tourism economy to enhance regional and national economic benefits.

Keywords: Consumption ability, Infrastructure and investment, Regional economic development, Supply-side reform, Tourism industry growth, Tourism revenue.

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Contribution of this paper to the literature

This study uniquely combines economic, transportation, and cultural factors to analyze tourism revenue in Hunan Province. Unlike previous research, it integrates urban and rural income effects with tourism-related cultural activities, providing a comprehensive, data-driven perspective on tourism growth from 2003 to 2019.

1. Introduction

Since the reform and opening up, the growth of China's tourist sector has accelerated (Chai, Li, Bao, Zhu, & He, 2021). The tourist sector's rapid growth has produced excellent outcomes, holding a significant place in the worldwide tourism market (Ma et al., 2021). Tourism is not just an economic and social activity, but also a cultural and social one. In comparison to other businesses, tourism also comprises components like food, lodging, transportation, travel, shopping, and entertainment (Li et al., 2021). Due to the expansion of the economy and the rise in demand for tourist consumption, tourism in Hunan has seen unheard-of growth (Hao, Niu, & Wang, 2021). The Hunan Provincial Bureau of Statistics reported in 2020 that the tourist sector in Hunan contributed up to 245.765 billion yuan in revenue in 2019. In general, tourism is crucial for supporting the nation's economic growth, preserving jobs, and preserving people's means of subsistence (Xie, Zhang, Sun, Chen, & Zhou, 2021). Furthermore, there is a dearth of studies on the elements that have contributed significantly to the fast growth of China's tourist industry (Qi, Wu, Wang, & Wang, 2021).

According to calculations based on data from the National Bureau of Statistics of China (2018) and the Hunan Provincial Tourism Industry Value Added Accounting Scheme (Figure 1), the added value of tourism and related industries in Hunan Province in 2019 was RMB245.765 billion, a 10.17 percent increase in current prices over the same period the previous year; it accounted for 6.18 percent of GDP, a 0.06 percentage point increase over the previous year. The tourist industry in Hunan had a surge from 2014 to 2019, as seen in the graph below. The data specifically from 2014, 141.946 billion yuan to 245.765 billion yuan in 2019, the industry's added value of about 100 billion yuan, completely indicates the tourist industry's tremendous potential for growth in Hunan Province. In light of this backdrop, Hunan Province has established several administrative laws to assist the growth of the tourist industry and places a high value on them (Zhang & Ju, 2021). The necessity to enhance the supply of services and speed up the growth of the cultural, tourism, and other service sectors is emphasised in both the 2035 Vision and the 14th Five-Year Plan for Economic and Social Development. Based on the many benefits of tourist manufacturing, tourism is seen as the industry of choice in many districts of Hunan. In light of this, a detailed analysis of the variables that have affected the growth of the tourist sector is both theoretically and practically very valuable (Yang et al., 2021). Through factor analysis and regression analysis, this paper empirically investigates the factors influencing the tourism economy in Hunan Province. By identifying the factors that contribute to the growth of the tourism industry in Hunan Province, it also offers a new theoretical framework for the development of the industry in other regions.

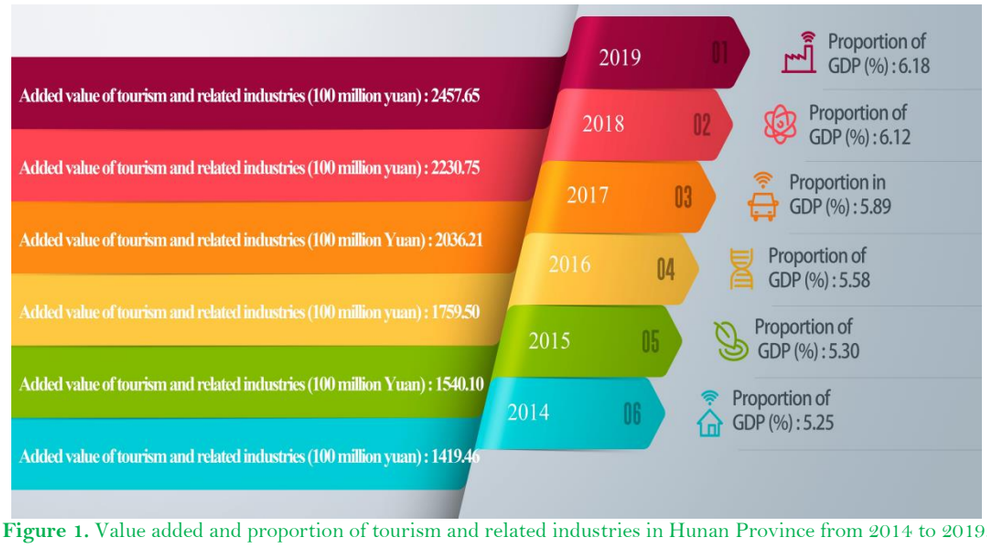

Figure 1. Value added and proportion of tourism and related industries in Hunan Province from 2014 to 2019.

2. Literature Review

2.1. Overview of Tourism

Tourism in Hunan is quickly developing into a cornerstone sector with significant growth potential because to its robust radiation function and strong driving capacity. The tourism sector is a diverse one that has a high level of significance and a significant driving force (Matthews, Scott, & Andrey, 2021). The World Tourism Organization has reported that the economic multiplier impact of the tourism industry is much larger than that of other businesses (Usman, Yaseen, Kousar, & Makhdum, 2021). In addition to being directly connected to the transportation, hospitality, and commodity trade sectors, the tourism industry also indirectly drives and influences the growth of other sectors such as agriculture, industry, urban development, and culture (Lin, Ling, Lin, & Liang, 2021). This can help to accelerate the development of contemporary service sectors like insurance and information. The tourist business is broad and diverse, and because of this, it has a clear driving force that may help one industry grow and benefit a hundred others (Liu, Chou, & Lin, 2021). The Hunan region's ecological surroundings, as well as its natural and humanistic scenery, may be greatly improved by the tourist business, which also uses very few resources while exerting a significant radiation effect (Chen, Bi, & Li, 2021). Hunan has recently put a lot of resources—both financial and human—into urban greening, old city restoration, new neighbourhood building, road reconstruction, river management, etc. The quality and cultural development of residents have generally

improved, which has significantly improved the city's ecological environment and investment climate, created the perception of excellent tourist cities with their own distinctive qualities and brands, and opened up new opportunities for the growth of tourism in Hunan Province. Therefore, concentrating just on these elements is still insufficient if an area wishes to build its tourist business in a sustainable and stable manner (Chenghu, Arif, Shehzad, Ahmad, & Oláh, 2021). Therefore, it is explored what elements influence the growth of the tourist sector and if there are variances in the strength of the impact of various aspects. The key drivers of the tourist economy may be efficiently identified by analysing and examining these topics, which is very important for the modernization and transformation of the tourism industry (Obeidat, Alalwan, Baabdullah, Obeidat, & Dwivedi, 2022).

Scholars are now researching and analysing the aspects that affect the growth of the tourist industry. According to preliminary results, current academics are mostly focused on how tourist resources influence tourism economic growth and see tourism resources as the primary driving force behind travel (Huang, Wang, Wang, Cheng, & Dai, 2021). The body of research demonstrates that key determinants of how the tourism sector develops include the environment, climate, and industrial makeup of tourist locations. The subjective demand elements of visitors, such as their individual preferences, one-time income, and free time, are the primary variables influencing the growth of contemporary tourism, followed by the objective supply aspects of tourism resources, such as tourism enterprises, facilities, and resources (Ho, Quang, & Miles, 2022). The growth of tourism is also influenced by external environmental elements such as political, economic, cultural, and emergency contexts. By performing factor and regression analyses on the overall growth of the tourist economy in Hunan Province, this research investigates the elements that are significant in fostering the development of China's tourism industry (Shi, Xu, & Xu, 2021).

2.2. Main Problems of Tourism Development in Hunan Province

2.2.1. The Overall Characteristics are Not Bright Enough

Although each of Hunan's tourist resources has unique qualities, none stand out in particular. It seems a little unfair to use slogans like "Famous mountains, water, buildings, and cities" and "Scenic Hunan, a little township with humanities." Feel the cloud town, excellent Hunan, fiery Hunan, lovely town, joyful Hunan, and other newly discovered areas. The emerging topics in tourism are often not widely understood. The primary focus is inactive even amid a beautiful landscape. Hunan has several well-known landmarks and tourist attractions, but the sector is underdeveloped and there is little awareness of regional collaboration. Hunan is a significant tourist destination with a wide variety of tourist attractions. According to certain estimates, Hunan is one of the top eight Chinese cities for overall tourist resources.

2.2.2. Unreasonable Development of Tourism Resources

Hengshan and Dongshan are two of the many natural tourist attractions in Hunan. And although this is a significant factor in the rise of customers coming in person in recent years, there are some issues with the growth of the resources. First of all, there is not enough preparation. Hunan has a lot of resorts for tourists, but they are primarily small-scale and individual. In particular, some areas solely take into account local interests while ignoring the bigger picture. Additionally, the growth of tourist resorts will not take into account the full benefits without a cohesive framework (Johnston, Crooks, & Ormond, 2015). Second, it unravels invisibly. The national tourist business has been booming in recent years. Particularly with the growth of tourists, some underdeveloped and impoverished places have thrived, and many towns and industries have started to promote tourism recklessly. Regardless of the specific circumstances in any location, numerous tourist initiatives are nearing their conclusion. Last but not least, the former administration has been fired. Major oversights existed in the prior administration of a number of tourist sites. They drew a lot of tourists and produced a lot of money, yet they nevertheless seriously harmed the environment's ecology.

2.2.3. Tourism Brand Construction is Backward

Problems with Hunan's tourist brand are mostly seen in the following areas: First off, Hunan has numerous tourist resorts, although they are often of good quality. However, the placement of the tourism brand is unclear. Innovative brand architecture in the tourism industry is lacking, and many businesses struggle to define themselves (Guo & Shi, 2022) because it is challenging to draw attention to the same kinds of tourist attractions. Second, Hunan Province has not paid enough attention to the development of its tourist brand and influence. Advertising is insufficient, and marketing in a single channel has not been effective enough in recent years. While Zhangjiajie Wulingyuan Scenic Spot has awareness in local and international markets at the moment, other tourist attractions still need to increase their brand impact.

3. Research Methods

3.1. Variable Selection and Data Sources

This paper uses tourism income as the dependent variable and the nine independent variables of railway mileage, road mileage, civil air passenger traffic, total number of people receiving tourism, art performance groups, gross domestic product of Hunan Province, disposable income of urban residents, disposable income of rural residents, and food and beverage companies as the independent variables. The research data used in this work covers the years 2003 to 2019, and they were gathered from the Hunan Statistical Yearbook and the Hunan Tourism Statistical Bulletin between those years, taking into account the accessibility of research data and the stability of research findings. The following introduces the pertinent variables (Table 1).

Tourism income (TI). Revenues from tourism There is a clear correlation between tourist earnings and the growth of tourism. Tourist income is a significant measure of Hunan's tourism economic growth, hence (Bano, Alam, Khan, & Liu, 2021).

Railway mileage (RM). In general, cross-regional consumption experiences for visitors are what we mean by tourism. As a more convenient and affordable form of transportation than other modes of transportation in the

current day, rail travel is often chosen by visitors. The construction of China's high-speed rail infrastructure in recent years, which significantly reduces the travel time for visitors to their destinations, is one factor that has accelerated the growth of the country's tourism industry. It is clear that railroad operating miles may have a direct impact on how the tourist industry develops (Xu & Yang, 2020).

Highway mileage (HM). The ease of direct access to tourist destinations has a direct impact on tourists' travel intentions. Family self-drive vacations have gained popularity since the turn of the twenty-first century, particularly as people's living standards have increased. Thus, a region's ability to draw visitors will be directly influenced by the degree of development of its transportation infrastructure. For the growth of the tourist industry, the sophistication of the highway network has a particularly large influence. As a result, one of the aspects considered impacting the expansion of the tourist industry is road miles (Cheng et al., 2021).

Civil air passenger traffic (CAPT). Nowadays, travelers often prefer to travel by plane if their destination is far away. However, civil air traffic includes both domestic and incoming air travel, so to some degree, the volume of passenger traffic is a direct reflection of how appealing an area is to both local and foreign visitors. In order to completely describe how much civil air traffic influences the tourist industry, one of the factors used in this article is civil air traffic (Shekarrizfard et al., 2020).

Total number of tourists received (TNTR). Tourism numbers: includes the number of inbound international tourists, the number of outbound residents and the number of domestic tourists. When it comes to tourism, a strongly dependent on tourism economic sector, the number of visitors may be a good indicator of how appealing a region is. It is essential to take into account the volume of visitors as a significant influencing element in the tourism sector in order to analyse the development of the tourism economy (Salazar, Swanson, Mozo, Clinton White Jr, & Cabada, 2012).

Performing arts group (PAG). The term "artistic performance groups" refers to all varieties of professional artistic performance groups and professional folk troupes that are organized by the cultural industry or managed by the sector (approved by the administrative department of the cultural market or those who have declared their registration and obtained the necessary license) and specialize in performing arts and other activities. The degree to which professional arts performance organizations have developed in Hunan Province is reflected in this metric. If performing arts organizations provide a specific contribution to the tourist economy, it is worthwhile to thoroughly examine this. Such an assumption serves as the foundation for this work, making it a key variable in the analysis of the effect on the tourist industry (Knudsen, Bookheimer, & Bilder, 2019).

Table 1. An example of a table.

Year	TI	RM	HM	DIUR	DIRR
2003	294.07	2771	85233	7674.2	2532.9
2004	371.59	2774	87875	8617.5	2837.8
2005	453.57	2802	88200	9524	3117.7
2006	588.39	2806	171848	10504.7	3389.7
2007	732.71	2799	175415	12293.5	3904.3
2008	851.75	2795	184568	13821.2	4512.5
2009	1099.47	3693	191405	15084.3	4910
2010	1425.8	3695	227998	16565.7	5622
2011	1785.78	3693	232190	18844.1	6567.1
2012	2234.1	3825	234051	21318.8	7440.2
2013	2681.86	4028	235396	24352	9028.6
2014	3050.7	4532	236250	26570.2	10060.2
2015	3712.91	4521	236886	28838.1	10992.5
2016	4707.43	4716	238273	31283.9	11930.4
2017	7172.62	4698	239724	33947.9	12935.8
2018	8355.73	5070	240060	36698.3	14092.5
2019	9762.32	5579	240566	39841.9	15394.8
Year	PAG	GDP	CAPT	TNTR	ACC
2003	86	4659.95	186	5970.11	251.17
2004	91	5542.62	260	6486.34	299.09
2005	91	6369.87	304	7180.98	356.9
2006	93	7431.55	363	9195.31	389.76
2007	96	9285.45	430	10897.47	461.13
2008	98	11307.36	419	12829.97	569.39
2009	110	12772.8	548	16065.03	573.96
2010	201	15574.32	606	20398.03	701.88
2011	114	18914.96	664	25328.29	828.83
2012	141	21207.23	708	30506.33	945.64
2013	227	23545.24	757	36058.12	1096.03
2014	271	25881.28	870	41202.53	1206.42
2015	273	28538.6	935	47330.73	1349.09
2016	439	30853.45	1091	56547.79	1531.34
2017	534	33828.11	1241	66934.58	1710.06
2018	510	36329.68	1403	75300.53	1862.99
2019	575	39752.12	1542	83154.1	2080.22

Gross product of Hunan Province (GDP). On the one hand, it demonstrates Hunan Province's current economic foundation and its capacity to invest in and develop tourist infrastructure; on the other hand, it shows how the population's ability to enjoy tourism is influenced by their level of living. Therefore, the GDP affects both the population's demand for tourism as well as the supply side of tourist development (Ai, Zhong, & Zhou, 2022).

Disposable income of urban residents (DIUR). To appreciate the well-being that tourist activities provide, it is necessary to have a certain financial basis since tourism is a spiritually consuming activity. In particular, the level of the locals' desire for tourism is highly correlated with their spare income after meeting their fundamental needs. Like this, urban inhabitants are the primary tourist market consumers in Hunan Province, and the growth of the tourism industry is strongly influenced by their disposable income (Xia, Liao, Wu, & Liu, 2020).

Disposable income of rural residents (DIRR). Rural inhabitants have also emerged as a significant consumer segment in China's tourist industry as a result of the societal advancements that have led to an increase in rural residents' incomes and a steady improvement in their quality of life. In 2019, 25.6% of China's tourist sector was made up of purchases made by rural residents. Therefore, one of the key factors influencing the growth of China's tourist industry is the disposable income of rural populations (Lei, Fan, Yang, & Si, 2022).

Amount of catering consumption (ACC). People directly spend money on food and drink when travelling, and the quantity eaten provides an insight into how quickly the tourist sector is growing. Food and beverage consumption is a crucial kind of consumption because when individuals travel, they immediately spend money on hotels and accommodations. Therefore, the economics of tourism is impacted by the consumption of food and drink (Neto, 2020).

3.2. Factor Analysis

3.2.1. Standardized Processing of Data

Direct data analysis was not feasible due to the vast number of variables used for this study, non-uniformity of units, and differences in magnitudes across variables; thus, standardization was necessary, leveraging square and normalization to convert to dimensionless data. Equation 1 contains the standardization of the data formula (1).

$$SSN_i = \frac{x}{\sqrt{\sum_{i=1}^{n} x_i^2}} \qquad (1)$$

The goal of normalizing the sum of squares is to use the "sum of squares" as the reference standard; all data is then divided by the "sum of squares," and the resulting data is equivalent to a percentage of the "sum of squares." This is accomplished by using Equation 1's method, in which all data is adjusted by the "sum of squares," which serves as the unit of measurement for all data. In this study, all variable data is standardized in accordance with formula (1) to take into account the law of normal distribution and to remove the impact of the dimension. Thereafter, factor analysis and regression analysis can be performed on the standardized variable data to further investigate the relationship between the variables. Table 2 displays the fundamental data of the variables after the standardization procedure.

Table 2. Basic indicators.

Variable	Sample	Min.	Max.	Average	Standard deviation	Median
TI	17	294.070	9762.320	2898.871	2953.964	1785.780
RM	17	2771.000	5579.000	3811.588	924.348	3695.000
HM	17	85233.000	240566.000	196819.882	57543.499	232190.000
CAPT	17	186.000	1542.000	725.118	406.104	664.000
PAG	17	86.000	575.000	232.353	174.484	141.000
GDP	17	4659.950	39752.120	19517.329	11551.030	18914.960
TNTR	17	5970.110	83154.100	32434.485	25446.380	25328.290
DIUR	17	7674.200	39841.900	20928.253	10422.246	18844.100
DIRR	17	2532.900	15394.800	7604.059	4267.174	6567.100
ACC	17	251.170	2080.220	953.759	583.733	828.830

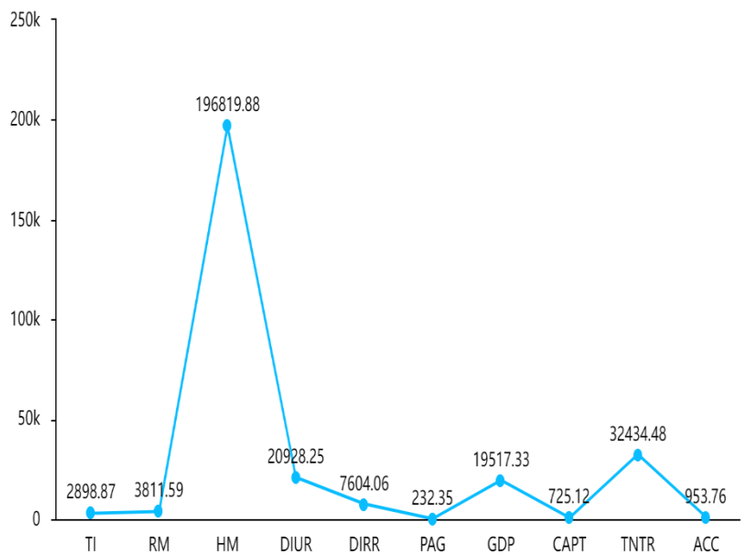

Figure 2. Comparison of mean values.

The general image of the data is described by descriptive analysis using means or medians (Figure 2). Because there are no outliers in the data in the table above, descriptive analysis can be performed directly on the mean. Finally, the data are normal, and descriptive analysis can be performed directly on the mean.

Table 3. KMO and Bartlett test.

Kaiser-Meyer-Olkin	**0.829**	
Bartlett test	Approximate chi-square	479.852
	df	36
	p-value	0.000

3.2.2. Inspection

The study data was first examined to determine its eligibility for factor analysis (Table 3), as can be seen from the table above; the KMO was 0.829, which is more than 0.6, satisfying the necessary conditions for factor analysis, indicating that the data may be used for factor analysis research. Additionally, the data passed the Bartlett's sphericity test ($p<0.05$), indicating that they are appropriate for factor analysis.

3.2.3. Factor Analysis

The aforementioned table examines the process of factor extraction and the volume of data that was taken from the factors (Table 4). From the above table, we can see that the factor analysis yielded a total of 2 components, each of which has a variance explained by rotation of 69.782 and 29.04 percent, respectively. Rotation explains 98.823 percent of the total variance.

Table 4. Table of variance explained rates.

Factor number	Feature root			Rotational front difference explained rate			Explained rate of variance after rotation		
	Feature root	Variance interpretation rate (%)	Cumulation (%)	Feature root	Variance interpretation rate (%)	Cumulation (%)	Feature root	Variance interpretation rate (%)	Cumulation (%)
1	8.446	93.847	93.847	8.446	93.847	93.847	6.28	69.782	69.782
2	0.448	4.976	98.823	0.448	4.976	98.823	2.614	29.041	98.823
3	0.059	0.656	99.479	-	-	-	-	-	-
4	0.031	0.343	99.822	-	-	-	-	-	-
5	0.013	0.142	99.965	-	-	-	-	-	-
6	0.002	0.018	99.983	-	-	-	-	-	-
7	0.001	0.012	99.995	-	-	-	-	-	-
8	0.000	0.004	99.998	-	-	-	-	-	-
9	0.000	0.002	100	-	-	-	-	-	-

Table 5. Table of factor loading coefficients after rotation.

Variable name	Factor loading coefficient		Degree of commonality (Common factor variance)
	Factor 1	Factor 2	
SSN_RM	0.832	0.519	0.961
SSN_HM	0.373	0.925	0.994
SSN_DIUR	0.856	0.514	0.997
SSN_DIRR	0.872	0.484	0.995
SSN_PAG	0.947	0.268	0.968
SSN_GDP	0.834	0.548	0.995
SSN_CAPT	0.872	0.479	0.991
SSN_TNTR	0.911	0.41	0.997
SSN_FBC	0.881	0.471	0.997

Note: If the figures in the table are colored, blue means that the absolute value of the load coefficient is greater than 0.4, and red means that the common degree (common factor variance) is less than 0.4.

To determine the correlation between the variables and the research items, the data from this study was rotated using the maximum variance rotation technique (varimax) (Table 5).

The table above displays how well the factors extracted information from the study items and the correspondence between the factors and the study items. It is clear that all of the study items have a commonality value above 0.4, indicating a strong correlation between the study items and the factors as well as the factors' ability to effectively extract information.

Analyze the connection between the factor and the research item after confirming that the factor can extract the majority of the information from the research item (when the absolute value of the factor loading coefficient is greater than 0.4, it means that the item and the factor have correspondence). As can be seen from the above table, the four variables of civil air passenger traffic (CAPT), total number of tourists received (TNTR), performing arts groups (PAG), gross domestic product (GDP) of Hunan Province, and the five variables of restaurant consumption (ACC) convert on the first common factor (F1), whereas the four variables of railway mileage (RM), road mileage (HM), disposable income of urban residents (DIUR), and disposable income of rural residents (DIRR) convert on the second (F2).

The component score coefficient matrix, as shown in Table 6, may be used to determine the linear connection between each common factor and the variables once the two common factors have been extracted.

(Tip)

1. A research item corresponds to multiple factors, which factor should be judged by combining professional knowledge.
2. The corresponding relationship between a research item and the factor is completely inconsistent with the psychological expectation, so the research item may be considered to be deleted.
3. A factor has no corresponding relationship with the research item, in this case, it can be considered to reduce one factor.
4. If there is no corresponding relationship between a study item and a factor, the study item may be considered to be deleted.

Table 6. Component score coefficient matrix.

Variable name	Component	
	Component 1	Component 2
SSN_RM	0.088	0.079
SSN_HM	-0.611	1.185
SSN_DIUR	0.108	0.050
SSN_DIRR	0.147	-0.015
SSN_PAG	0.402	-0.444
SSN_GDP	0.061	0.126
SSN_CAPT	0.152	-0.024
SSN_TNTR	0.244	-0.175
SSN_ACC	0.167	-0.046

The table of "component score coefficient matrices" is disregarded if the goal of factor analysis is information enrichment (Table 6). If factor analysis is used to weight the research items, the "component score coefficient matrix" is utilised to produce the relationship equation between the factors and the study items (Based on standardised data to create a relationship expression).

$$F1 = 0.088 * SSN\_RM - 0.611 * SSN\_HM + 0.108 * SSN\_DIUR + 0.147 * SSN\_DIRR + 0.402 * SSN\_PAG + 0.061 * SSN\_GDP + 0.152 * SSN\_CAPT + 0.244 * SSN\_TNTR + 0.167 * SSN\_ACC$$

$$F2 = 0.079 * SSN\_RM + 1.185 * SSN\_HM + 0.050 * SSN\_DIUR - 0.015 * SSN\_DIRR - 0.444 * SSN\_PAG + 0.126 * SSN\_GDP - 0.024 * SSN\_CAPT - 0.175 * SSN\_TNTR - 0.046 * SSN\_ACC$$

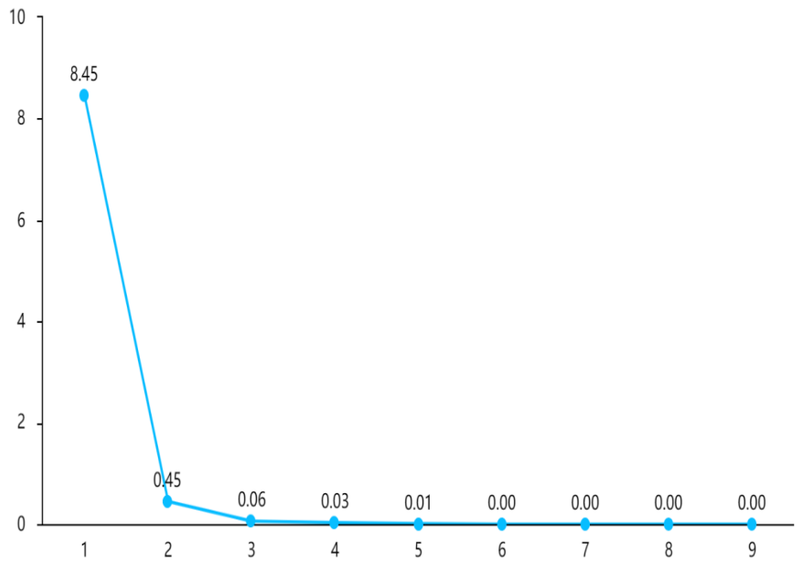

Figure 3. Lithotripsy.

The reference number of components extracted when the line abruptly turns smooth is the number of factors extracted from the steep to smooth line (Figure 3). The gravel diagram only aids in the selection of a few parameters. In practical research, the number of variables is often determined by a thorough balancing judgement based on professional expertise, along with the circumstance of the connection between factors and study items.

Table 7. Component score coefficient matrix.

Name	Factor 1	Factor 2	Composite scoring coefficient	Weighted (%)
Feature root (After rotation.)	6.280	2.614		
Variance interpretation rate	69.78%	29.04%		
SSN_RM	0.3320	0.3208	0.3287	11.27%
SSN_HM	0.1486	0.5719	0.2730	9.36%
SSN_DIUR	0.3415	0.3181	0.3346	11.47%
SSN_DIRR	0.3479	0.2996	0.3337	11.44%
SSN_PAG	0.3777	0.1658	0.3154	10.81%
SSN_GDP	0.3327	0.3388	0.3345	11.46%
SSN_CAPT	0.3481	0.2964	0.3329	11.41%
SSN_TNTR	0.3633	0.2535	0.3311	11.35%
SSN_ACC	0.3515	0.2910	0.3337	11.44%

Factor analysis can use load coefficient information for weight calculation (Table 7). The calculation is divided into three steps, which are as follows.

First, calculate the linear combination coefficient, the formula is: loading matrix /Sqrt (Eigen), that is, the load coefficient divided by the square root of the corresponding characteristic root.

Second: calculate the comprehensive score coefficient, the formula is: cumulative (linear combination coefficient * variance explanation rate)/cumulative variance explanation rate, that is, the linear combination coefficient and variance explanation rate, respectively, multiply and accumulate, and then divide by the cumulative variance explanation rate.

Third: Calculate the weight, and normalize the comprehensive score coefficient to get the weight value of each index.

Fourth: The above loading matrix, characteristic root Eigen, variance interpretation rate or cumulative variance interpretation rate are all the corresponding values after rotation.

Table 8. Component score coefficient matrix.

	Non-standardized coefficients		Normalized coefficients	t	p	95% CI	VIF
	B	Standard error	Beta				
C	0.172	0.009	-	20.145	0.000***	0.156 ~ 0.189	-
F1	0.165	0.009	0.94	18.71	0.000***	0.148 ~ 0.182	1
F2	0.050	0.009	0.286	5.703	0.000***	0.033 ~ 0.068	1

Note: Dependent variable: SSN_TI. *** p<0.01.

3.3. Regression Analysis

With F1, F2 acting as the independent variables and SSN TI acting as the dependent variable, a linear regression analysis was conducted, as can be seen from the above table (Table 8), from which the model equation can be observed.

$$SSN\_TI = 0.172 + 0.165 * F1 + 0.050 * F2$$

According to the model's R-squared value of 0.965, F1 and F2 can account for 96.5 percent of the variance in SSN TI. The model passed the F-test (F=191.293, p=0.000<0.05), indicating that at least one of the factors F1, F2 would have an impact on SSN TI. The regression coefficient value for factor F1 was 0.165 (t=18.710, p=0.000<0.01), indicating that factor F1 would have a substantial positive impact. With a regression

coefficient of 0.050 (t=5.703, p=0.000<0.01), F2 significantly influences SSN TI in the positive. As a result of the investigation, it is clear that F1 and F2 significantly impact SSN TI.

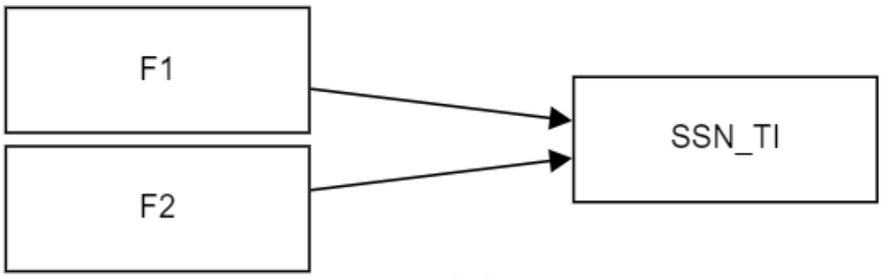

Figure 4. Model diagram.

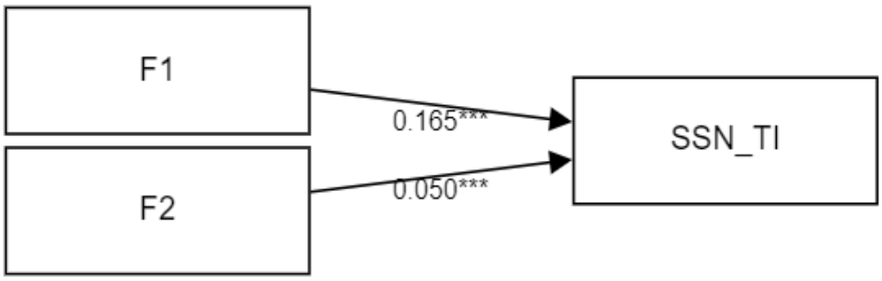

Figure 5. Model result diagram.

Note: ***p < 0.01.

Table 9. Model summary (Intermediate process).

R	R 2	Adjust R 2	Model error-RMSE	DW	AIC	BIC
0.982	0.965	0.960	0.032	0.800	-62.746	-60.246

A linear regression analysis was carried out using SSN TI as the dependent variable and F1,F2 as the independent variables (Figure 4), as shown in the table above (Table 9). As observed in the above table, the model's R-squared value is 0.965 (Figure 5), which indicates that F1 and F2 can account for 96.5 percent of the change in SSN TI's cause.

Table 10. ANOVA table (Intermediate process).

	Sum of squares	df	Mean square	F	p-value
Regression	0.477	2	0.238	191.293	0.000
Residuals	0.017	14	0.001		
Total	0.494	16			

The model was evaluated and, as can be seen from the table above (Table 10), it passed the F-test (F=191.29, p=0.000<0.05). This indicates that the model design is valid.

4. Conclusions and Suggestions

4.1. Research Conclusions

This paper chooses nine variables that may affect tourism economic development through quantitative empirical research based on the tourism economic development data of Hunan Province over the 17 years from 2003 to 2019, including: railway mileage (RM), road mileage (HM), civil air passenger traffic (CAPT), total number of tourists received (TNTR), performing arts groups (PAG), Hunan Province Gross Production Value (GDP), Disposable Income of Urban Residents (DIUR), and Amount of catering consumption (ACC). Two common factors were derived from these nine variables by factor analysis (F1, F2).

Regression analysis revealed that both F1 and F2 contributed significantly to tourist revenue. The regression equation for the factors affecting tourist revenue was developed using the score matrices for each variable and the vector of common factor regression coefficients. According to the findings of the regression, all of F1 and F2 will have a strong positive effect on tourist revenue. It can be deduced that the following factors significantly affect the relationship between tourism income and railway mileage (RM), road mileage (HM), civil air passenger traffic (CAPT), total number of tourists (TNTR), performing arts groups (PAG), Hunan provincial gross domestic product (GDP), disposable income of urban residents (DIUR), disposable income of rural residents (DIRR), and Amount of catering consumption (ACC).

4.2. Research Recommendations

Based on the examination of the variables influencing the development of the tourist sector in Hunan Province, this article proposes the following suggestions in order to better promote its growth.

4.2.1. Strengthen the Pillar Status of Tourism, Increase Investment, and Form a Joint Force for Development.

4.2.1.1. Further Increase Investment and Give Full Play to the Driving Role of Tourism

Hunan's tourist resources are now developing in an uncertain manner with just financial backing. Long building cycles and significant capital consumption are characteristics of the creation and growth of tourist resources. Although the government has also established a tourism development fund, which is allocated on a yearly basis, it is still a drop in the ocean, leading to some promising tourism projects whose development pace is

far from reaching the fast surge in visitor demand owing to financial issues. The growth of tourism in Hunan has been hampered by matching debts for transportation, energy, product development, and tourist security measures. In order to fully exploit the significant contribution of the tourism sector to increasing employment rates and boosting consumption, it is necessary to increase investment, accelerate the improvement of the Hunan tourism industry system, further strengthen the tourism element system, tourism destination system, tourism product system, and tourism safety and quality assurance system (McCrossan, Martin, & Hill, 2021).

4.2.1.2. Try to Solve the Bottleneck Problem of Tourism Development

The limited ability to control the tourist sector is a problem that is being addressed. Despite being the government, the Ministry of Tourism has limited resources and is unable to adequately supervise spatial planning, project viability, big corporate investments, etc. To ensure that the tourist industry is able to properly carry out its duties, a platform for government intervention in the aforementioned areas is advised (Vovk, Beztelesna, & Pliashko, 2021).

4.2.2. Focus on the Establishment of Tourism Brands to Improve the Competitiveness of Hunan Tourism

4.2.2.1. Strengthen Tourism Publicity and Create a Unique Image of Hunan Tourism

Over the last several years, Hunan Province's tourism industry has expanded dramatically. 90% of counties, prefectures, and municipalities have tourism as a local pillar business. However, as shown by poor management principles, attractive locations are separated into political spheres, which hinders the overall image of Hunan's tourist industry and does not support the development of a favourable brand for Hunan's tourism industry. In particular, to increase the degree of worldwide attention, there is not enough external exposure. For the objective reality outlined above, this essay suggests the following remedies. First, travel marketing. Create and enhance a public relations and marketing campaign for the travel industry, with picturesque locations serving as the default spokespersons. A promotional and publicity force are created by big corporations to promote tourist goods in picturesque places, so enhancing their appeal and competitiveness (Bulatovic & Iankova, 2021).

Secondly, regional cooperation and joint advocacy. Encouraging collaboration with tourist organisations, travel firms, as well as media outlets in order to acquire complementary benefits, exchange resources, and mutually encourage each other via passenger routes is a vital part of the strategy for promoting mutual growth.

Third, utilise all available media. Create a brand image for "Charming Hunan" through media such as television, the internet, newspapers, and other channels of communication. Boost the primary media in Hunan's public image and enhance the procedures for media collaboration. Take advantage of the chance to substitute programmes promoting tourism over the holidays. Strengthen the tourist network, update the Hunan tourism network, create connections with the major online media, and provide integrated tourism services for the platform that hosts tourism information.

Fourth, fully exploit the tourist season. Utilize tourism, cultural events, and major festivals as appropriate. To increase the efficacy of the festival's impact, it is carefully planned and tailored to the local environment, highlighting features and qualities while adding brightness.

4.2.2.2. Highlight the Characteristics of Hunan and Establish a Tourism Brand

Tourism depends on well-known brands to entice, maintain, and attract customers. Zhangjiajie's tourist resources are uncommon and unique on the globe, making it famous both domestically and internationally for its distinctive quartz sandstone peak forest scenery. Making Zhangjiajie a well-known travel destination is crucial. The historic cities of Phoenix, Shao Shan, Dong Ting Lake, Yue Yanglou, and Nan Yue will be combined with it at the same time in an attempt to establish a golden path that will affect both local and foreign visitors. An information system for tourism is required. Tourist and tourism marketing, as well as tourism and tourism management, are all included in the exquisite creation and digital administration of the "digital landscape." To accomplish online synchronous opening, online ticketing, online booking, online group, online tourist consultation, and other e-commerce via the "digital environment." In order to offer excellent, efficient, and compassionate services that satisfy visitors, it is even more important to increase the building of supporting facilities in scenic places to incorporate standards and norms for the industry (Shahzad, Qu, Rehman, & Zafar, 2022).

4.2.3. Develop Tourism Products and Expand the Tourism Market

4.2.3.1. Strengthen Regional Cooperation

The significance of these guidelines for regional openness and cooperation should be better understood. The focus should be turned to the need for regional collaboration based on sustainable development in order to support the creation of a regional cooperation model. Beginning with the fundamental requirement for sustainable development, we will progressively include ecological restoration, pollution prevention and control, social governance, and the raising of people's standards of living in the scope of regional cooperation and examine practical and effective forms of cooperation (Ferraresi & Gucciardi, 2022)). To attain inclusive outcomes, we must secondly embrace a dictatorial and long-term vision. In order to prevent the temptation to emphasise individual interests, we must take into account both the overall interests of the cooperative area and all of the party's individual interests. For the sake of long-term growth, transparency and cooperation should be prioritized (J. Yang, Zhang, Liu, Li, & Liang, 2022). Future stability should not be sacrificed for immediate benefit, and a fixation on outward appearances should not get in the way of real collaboration. To increase the size of the cake for the advantage of all parties and in the interest of mutual benefit and shared progress, we should aggressively seek openness and collaboration. Thirdly, we must foster a culture of openness and cooperation while broadening our perspectives. We'll keep coming up with new ways to collaborate, broaden the scope of what we collaborate on, and increase the frequency and depth of our collaboration. Resources, technology, and money will be attained via openness and cooperation, as well as knowledge of management systems. It may take the form of ad hoc communication and conversation or a method for ongoing cooperation to increase its influence and fortify its right to speak (Rocca & Zielinski, 2022).

4.2.3.2. Integrate the Source Market and Develop Characteristic Tourism Products

The markets in and surrounding Hong Kong, Macau, Taiwan, the Republic of Korea, Japan, and ASEAN should be stabilised. We should also aggressively analyse the EU market, which is controlled by Germany, and start to investigate the markets in Eastern Europe, North America, Australia, and New Zealand. It is crucial to stabilise the Korean market since it is the largest source of international tourists to Hunan. There will be efforts made to sustain the Japanese market's steady expansion since it is a high-end market that is comparatively stable. Traditional tourist destinations for Hunan include Hong Kong and Macau. In order to collaborate with Hong Kong and Macau on a multilateral basis and create mutually beneficial outcomes, we must make use of the "Pan-Pearl Triangle Cooperation Zone." Hunan has access to the market in Southeast Asia. The benefits of close proximity and cultural affinity need to be used more consistently. We must keep up our marketing initiatives in the Taiwanese market in order to promote cross-strait collaboration and trade as well as the reunion of the homeland. To boost high-end tourism and inbound tourism, we should concentrate on European and North American countries, like Germany, and develop markets like Australia, New Zealand, and the United States. For tourists, there should be a diversified source market.

To further strengthen tourism products such as holiday and leisure products, sightseeing and leisure, residential leisure, hot spring recreation, sports and leisure, film and television tourism, and travel and tourism, it is necessary to adjust how they are used. This will benefit the rapidly expanding domestic tourism market. To meet the demands of public leisure and entertainment, concentrate on developing green ecology, ethnic classics, history and culture, folk customs, geological wonders, archaeological discoveries, water recreation, rafting, hot spring resorts, industrial tourism, rural experience, and urban leisure, and actively guide the development of branded hotel chains and resort industries to meet the various types of special rural needs. Improve the development of campsites, hotels, and self-drive camps to facilitate the creation of routes. It is critical to cater to the various levels and types of visitor demands in order to support the diversification of the tourism industry.

4.2.4. Speed Up the Construction of Tourism Legal System and Promote the Rapid and Healthy Development of Tourism

4.2.4.1. Strengthen Laws to Standardize the Order of Tourism and Improve the Tourism Environment

In Hunan Province, the absence of a legislative framework for tourism has significantly hampered the growth of the industry. We must move quickly with the research to construct and improve the legal social security system for the growth of the tourist industry, as well as to increase knowledge of, and capacity for, legal development and governance. To widen the route of tourist growth in Hunan and establish a larger tourism development environment, it is essential to fully exploit regional assets and adopt relevant tourism policies. In order to keep up with the demands of Hunan's growing tourist sector, the legal framework for travel and tourism is being built at a faster pace than before, putting the sector on a path toward standardisation and legalisation (Hauptmeier & Kamps, 2022).

4.2.4.2. We Should Adjust the Industrial Structure and Promote the Balanced Development of All Factors of Tourism

Hunan tourism's weakest link is shopping. Increasing the percentage of visitors' spending on tourism is crucial since tourism goods are the most robust of the industry's primary components (Zou, Wei, Ding, & Xue, 2022). In order to understand the market demand focused on the production, supply, and marketing of a specific tourism commodity, the government should improve cooperation and relevant departments should collaborate to provide guidance and management to producers of tourism goods who have been shortlisted (Fernandez-Navia, Polo-Muro, & Tercero-Lucas, 2021). This can be done through macro-guidance, policy support, and equipment investment. brand, brand figure, and the formation of a large-scale production of tourism products by actively cultivating a variety of special local products for the tourism industry, including handicrafts, food, books, audio and video products, and other consumer goods, in combination with the distinctive features of Hunan tourism. The development of coordinated tourism commodity sales businesses, the creation of tourism commodity stores, a multi-channel, multi-form sales network, active innovation in tourism commodity marketing, the creation of tourism commodity exhibitions, and the development of tourism commodity market bazaars all continued to grow in the state to boost tourism-related income and generate foreign currency.

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