Research on the Forecast of Tourist Volume in Muli County Based on Telecom Big Data

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ABSTRACT

There are many tourism resources in Muli County, and the number of tourists has increased rapidly in recent years. This paper makes a detailed analysis of the number of tourists in Muli County, tourists' preferences for tourism products, and their stay time based on the telecom big data, makes a scientific prediction of future tourists, and guides the key points and development strategies of recent tourism development of Muli County.

Keywords: Muli County, Tourist volume forecast, Ways.

1. INTRODUCTION

With the continuous development of social economy, tourism has become an important driving force to promote national and regional economic development. Tourists are the main body of tourism activities and the key factor of tourism development. The prediction of the number of tourists is the basic basis for a region to formulate a scientific and reasonable tourism development plan, which is conducive to the rational allocation of tourism infrastructure, the improvement of tourism service quality and the enhancement of tourism experience. It has important practical significance. [1]

Muli Tibetan Autonomous County is located in the west of Liangshan Yi Autonomous Prefecture, Sichuan Province. It is the only Tibetan autonomous county in Sichuan Province, is located in the core area of the Great Shangri La Ecotourism Area, and is an important node of the Western Liangshan Prefecture's characteristic scenery tourism area and the Shangri La Golden Corridor tourism economic belt. The county has magnificent mountains and rivers, beautiful scenery, and charming scenery. It is a tourist resort integrating mountaineering, exploration, browsing, sightseeing, investigation, and hot spring bathing. It is known as "green treasure house", "natural zoo", "golden world", and "the last Shangri La". [2] With the improvement of tourism infrastructure in recent years, more and more tourists choose to come to this "God's Garden" to seek physical and mental purification.

This paper takes the number of tourists in Muli County as the research object, uses the national aggregation data of China Telecom, selects the weighted moving average method to forecast the number of tourists in Muli County, forecasts the number of tourists in Muli County in 2023, provides decision-making reference and basis for the tourism department of Muli County, and further promotes the development of tourism in Muli County.

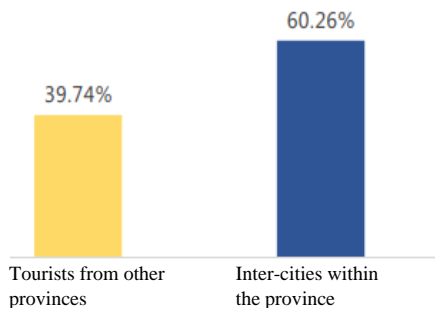## 2. TOURIST VOLUME OF MULI COUNTY BASED ON TELECOM BIG DATA

Big data technology is the latest achievement of information technology development. With the arrival of the era of culture and tourism integration, big data technology is widely used in various cultural tourism scenarios [3]. However, because it has the ability to directly obtain massive data from tourists, tourism enterprises and various tourism related industries and management departments, and to store and process them [5], such as Xin Yang et al. (2015) [4] Zhu Sheng et al. (2017) [7], Yang Yang et al. (2017) [8], Wang Xiuling (2018) [5] and other Chinese and foreign scholars have discussed the application of big data technology in tourism forecasting and statistics. Wen Ling et al. (2017) believed that due to the objectivity of big

data, its credibility is much higher than the questionnaire, and it is an inevitable trend to include it in tourism statistics [9]. Bao Jigang et al. (2020) [6] proposed that the tourist statistics method based on big data breaks through the limitations of data collection, storage and processing capabilities, and can rely on its infinitely increased multi-dimensional sample space to make up for the information loss and estimation accuracy caused by insufficient samples.

Chinese scholars Yang Bo (2019) [10], Jiang Zhiping and others (2021) [11] have respectively used the big data of China Unicom and mobile communication to carry out research on the application of big data in tourism statistics. In this paper, according to the big data of China Telecom, the number of tourists in Muli County in 2022 has been counted. ("Table 1")

Table 1. Number of tourists in Muli County in 2022 (unit: 10000)

Month	January	February	March	April	May	June
Number of people	19.34	19.65	18.83	20.02	18.6	14.7
Month	July	August	September	October	November	December
Number of people	16.6	19.16	20.23	20.15	16.9	15.74

Based on the statistical analysis of SIM card information of intelligent terminals, the annual tourist volume of Muli County reaches 2.1992 million person times, and tourists from other provinces only account for 39.74%.

Figure 1 Proportion of tourists inside and outside Muli County in 2022.
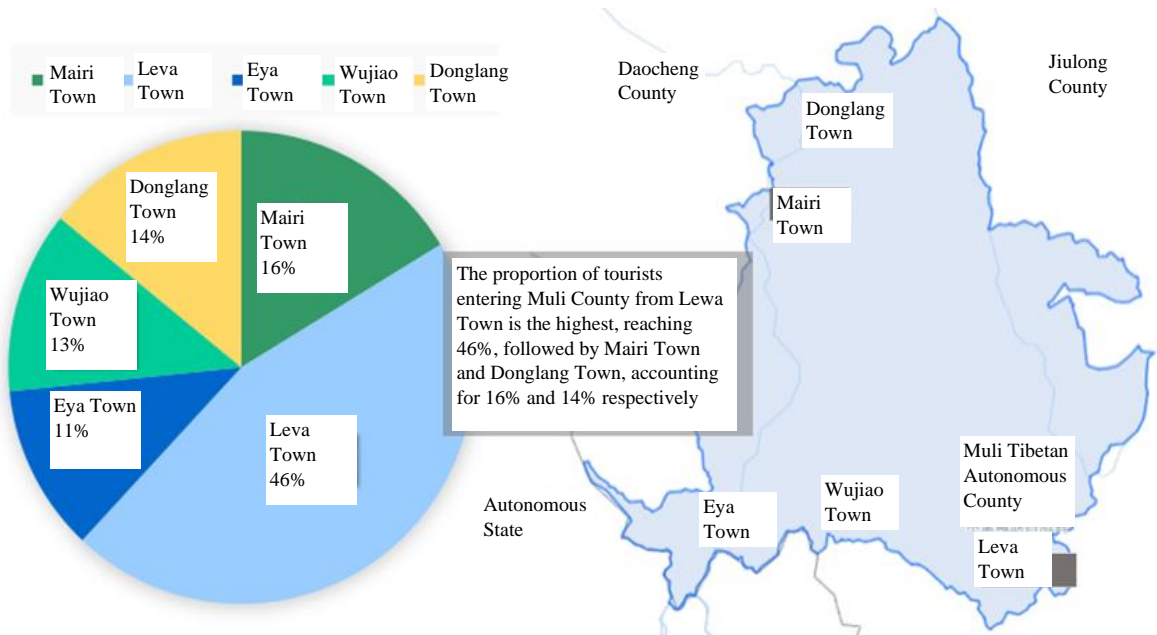

Figure 2 Statistics of main entrances for tourists to Muli County.

Based on the statistical analysis of SIM card positioning information of intelligent terminals, tourists in Muli County mainly enter Muli from Lewa Town in the southeast via National Highway 227, accounting for up to 46%, and relatively few from other directions.

3. FORECAST OF TOURIST VOLUME IN MULI COUNTY IN 2023

The weighted moving average method is a method that gives different weights to the observed values, calculates the moving average value according to different weights, and determines the predicted value based on the final moving average value. This paper establishes a prediction model based on the number of tourists in Muli County in 2022, and then uses the model to predict the number of tourists received by Muli County's tourism market in 2023, providing a reference for the development of Muli County's tourism industry.

The prediction model formula is

$$M_{tw} = \frac{w_1 y_1 + w_2 y_2 + \ldots + w_N y_{t-N+1}}{w_1 + w_2 + \ldots + w_N}, t \geq N$$

$$\hat{y}_{t+1} = M_{tw}$$

Take w1=3, w2=2, w3=1, from which the predicted value from January to December 2022, as well as the absolute error and relative error between the statistical value and the predicted value can be obtained according to the prediction formula, see "Table 2" for details.

Table 2. Prediction table of weighted moving average prediction model in Muli County

Month	t	Statistical value	Predicted value	Absolute error	Relative error
January	1	19.34			
February	2	19.65			
March	3	18.83			
April	4	20.02	19.19	0.83	4.15%
May	5	18.6	19.56	0.96	5.17%
June	6	14.7	19.11	4.41	30.01%
July	7	16.6	16.89	0.29	1.73%
August	8	19.16	16.30	2.86	14.93%
September	9	20.23	17.56	2.67	13.18%
October	10	20.15	19.27	0.88	4.38%
November	11	16.9	20.01	3.11	18.41%
December	12	15.74	18.54	2.80	17.78%

Since the average of the total forecasted values is higher than the actual value, the average relative error is used to correct the forecast values for each month of 2022.

Average relative error =

$$\left(1 - \frac{\sum \hat{y}_t}{\sum y_t}\right) \times 100\% = -2.67\%,$$

Therefore, the revised forecast model was used to predict the number of tourist receptions in Muli County in 2023, and the forecast results are shown in "Table 3".

Table 3. Forecast number of tourist receptions in Muli County by month in 2023 (Unit: 10,000 people)

Month	January	February	March	April	May	June
Number of people	17.32	17.18	17.46	17.82	18.08	18.38
Month	July	August	September	October	November	December
Number of people	18.68	18.99	19.30	19.62	19.94	20.26

According to forecasts, the total number of tourist receptions in Muli County in 2023 will be 2,230,200. This shows that the number of tourists received by Muli County in the future is still growing, and the development of tourism industry has great market potential.

According to the proportion of tourists inside and outside Muli County, the number of tourists from outside the province will reach 886,300 in Muli County in 2023, and the source market outside the province will be further expanded.

According to the forecast, the number of tourists entering the main entrances in Muli County is shown in "Table 4".

Table 4. Tourist entry by major entrance in Muli County in 2023 (Unit: 10,000 people)

Entrance location	Leva Town	Donglang Town	Mairi Town	Wujiao Town	Eya Town
Number of people	102.59	31.22	35.68	28.99	24.53

4. MULI COUNTY TOURISM INDUSTRY DEVELOPMENT PATH

According to the above analysis, with the rapid increase in the number of tourists in Muli County and the continuous expansion of the source market, the tourism industry in Muli County has entered a golden period of development. In the future, Muli County needs to base on its own abundant and high-quality resource advantages, highlight the best tourism destination brand of China Greater Shangri-La Ecotourism Loop, strengthen the upgrading of key tourism nodes and products, and realize the leap and upgrade of the tourism industry.

In order to promote the development of tourism industry in Muli County to a higher level and improve the experience of tourists, this paper puts forward the following suggestions for the tourism development of Muli County from three aspects: tourism product development, regional linkage cooperation and innovative service capabilities.

4.1 Green Development to Create Characteristic Tourism Reception Products

According to the 2021 government work report of Muli County, by the end of 2021, Muli County has no national A-level tourist attractions, established 2 tourism cooperatives, built 100 collector's music and star-rated homestays that meet the standards, and achieved a total tourism income of only 160 million yuan throughout the year.

Therefore, Muli County needs to deeply practice the theory of "green water and green mountains are gold and silver mountains", and actively build an eco-tourism product system with green as the base. It is also necessary to make full use of geographical advantages and good ecological environment, constantly explore new modes of nature conservation and resource utilization, focus on the "source of Shangri-La", practice hard, strengthen the construction of cultural and tourism infrastructure, and transform the "cornucopia" of Muli tourism resources into a "kaleidoscope" of tourism products. With the support of the six key industries of "food, accommodation, travel, tourism, shopping and entertainment", and the extension of the three major industries of "agriculture, culture and health", it will drive the transformation and upgrading of the industry, upgrade the level of eco-tourism products, and enrich new business products such as scientific expeditions, nature experiences, forest health care, research and education, and special tourism.

4.2 Regional Cooperation to Achieve Brand Co-construction and Development

From the perspective of tourism location and resource characteristics, Muli County needs to establish cooperative relationships with several major tourism sectors inside and outside the province, such as Yanyuan, Daocheng, Xichang, Lijiang and Shangri-La, to achieve development and further expand the market for tourists outside the province.

The first is the traffic cooperation and smooth passages. It is very important to continuously improve the traffic conditions at the main entrances in the county, and accelerate the planning and construction of major transportation channels such as the Muli Branch Line of Xixiang Expressway, Daoli Expressway, Panyan Expressway, G227, Luya Highway, and Yasan Highway; It is also important to promote the construction of a "one-hour" direct highway from Muli County to Yanyuan Lugu Lake to smooth the "land access channel" for tourism; There is a necessity to accelerate the site selection and construction of Muli General Airport, and rely on the general airport to establish a tourism "fast forward channel" between Muli and Panzhihua, Daocheng, Ninglang,

Dali, Shangri-La, Xichang and other surrounding areas; Relying on the waters of the Yalong River, there is also a necessity to build a tourist wharf and open up a new tourism channel in the eastern part of Muli. The second is to build a brand and take advantage of the momentum to develop. Muli County can cooperate with Daocheng County on high-grade resources such as Gombala Sacred Mountain and Aden Scenic Area to jointly create a world-class Rock eco-tourism destination; Collaborate with Shangri-La, Daocheng, Yanyuan, Xichang and other regions to build the Tibetan-Qiang Yi Cultural Industry Corridor; Relying on the cultural resources of the matriarchal family village of Lijiazui in Yajiao, Muli County can cooperate with Yanyuan and Ninglang to jointly build the Mosuo Cultural Tourism Zone; Relying on the original ecological Naxi culture of the Great Village of Oya, Muli County can cooperate with Lijiang to build the Naxi Cultural Tourism Zone.

4.3 Innovative Development to Create a National Benchmark for the Construction of Micro-scenic Spots (Internet Celebrity Check-in Points)

Micro scenic spot (Internet celebrity check-in point) is based on tourism attraction but low development efficiency of tourism resources, to ensure the safety of tourists as the premise of improving supporting facilities, and fully meet the needs of tourists' self-driving services, with better social benefits.

Muli County is rich in tourism resources and attractive, but the infrastructure conditions are poor, and it is difficult to carry out large-scale development and construction. The construction of micro-scenic spots (Internet celebrity check-in points) has the advantages of low investment and simple operation, which can promote the real formation of a general pattern of all-round tourism in Muli. In recent years, in accordance with the idea of "strengthening supporting facilities and rejuvenating the county through tourism", Muli County has actively sought project support, and built multi-functional small service areas with local characteristics such as observation decks, parking and water filling areas, rest areas, public toilets, shopping and other local characteristics in Muli in many scenic spots such as National Highway 227, Woluo River Grand Canyon Observation Deck in Leva Township, Renjiang Temple in Wujiao Township, Karl Ranch, etc., improving the tourism grade and comprehensive reception capacity, and

laying a solid foundation for the construction of a "micro-scenic spot (Internet celebrity check-in points)" system in Muli County. In the future, Muli County should first upgrade the existing tourist attractions with higher grades and obvious characteristics in the territory, add characteristic landscape facilities, carry out theming and characteristic creation, and build a variety of "Internet celebrity check-in points". Second, according to the resources and site conditions, it is necessary to build ecological parking lots and tourist public toilets for tourists, compile tour routes and self-driving hand-drawn maps, improve tourist identification systems such as scenery introduction boards, road traffic signs, guide signs, and safety assurance equipment such as first-aid kits, oxygen cylinders, and emergency callers, and improve the service level of tourism facilities in the whole region. According to the situation of the points, it is also necessary to support agricultural specialty products stores and stalls, drive the sales of ecological agricultural products, and gradually form its own characteristic "micro-scenic spot (Internet celebrity check-in points)" construction standard from seven aspects, such as resource combination, safety rescue, transportation facilities, service elements, sanitation facilities, sign guidance, and public information, so as to create a national demonstration benchmark.

5. CONCLUSION

Based on the big data statistics of telecommunications, this paper establishes a prediction model for the prediction of tourist numbers in Muli County by combining the weighted moving average method. Using the forecast model to predict the number of tourists in Muli County in 2023, it can be seen that the number of predicted people is still growing. Therefore, the predicted results can be used to guide current and future activities, and provide a reference and basis for the formulation of tourism-related development plans in Muli County. When developing tourism resources and building tourism-related supporting infrastructure, relevant units can consider the possible growth of tourists in Muli County in the next few years, and try to meet the tourism service reception needs of tourists under the premise of scientific and reasonable premise, so as to promote the further development of Muli tourism and realize "tourism rejuvenation of the county".

AUTHORS' CONTRIBUTIONS

Bingquan Ren is mainly responsible for thesis topic selection, thesis structure, research focus and data collection and analysis; Zhiquan Yang is mainly responsible for thesis writing and revision, data collection and analysis.

REFERENCES

[1] Zhang Haodong, A Study on the Forecast of the Number of Tourists in Wuhan [J]. Statistics and Management, 2019 (4). (in Chinese)

[2] Liu Jie, The Last Shangri La — A Preliminary Study on the Change of the County Town of Muli Tibetan Autonomous County, Sichuan [J]. Sichuan Architecture, 2014, 34(03): 30-33. (in Chinese)

[3] Dai Bin, The Age of Integration of Culture and Tourism: Big Data, Commercialization and Better Life [J]. Renming Luntan · Xueshu Qianyan, 2019 (11). (in Chinese)

[4] [4] Xin Yang et al. Forecasting Chinese Tourist Volume With Search Engine Data [J]. Tourism Management, 2015, 46: 386-397.

[5] Wang Xiuling, Research on the Application of Big Data in Tourism Statistics, Industrial & Science Tribune, 2018 (23). (in Chinese)

[6] Bao Jigang, Wang Yajuan, Tang Yonggang, Mo Mingjian, Wang Xianzhang, Chen Huiyan, Research on the Statistical Problem of Visitor Number from the Big Data Perspective [J]. Tourism Forum, 2020 (1). (in Chinese)

[7] Zhu Sheng, Liu Jinyang, Building a Large Tourism Statistics System [J]. China Statistics, 2017 (11). (in Chinese)

[8] Yang Yang, Liu Fajian, Some Problems in Big Data Tourism Research and Application [J]. Tourism Tribune, 2017 (09). (in Chinese)

[9] Wen Ling, Li Ying, Big Data and Tourism Statistics [J]. Tourism Tribune, 2017 (09). (in Chinese)

[10] Yang Bo, Research on the Application of Unicom's Passenger Flow Big Data in Tourism Statistics — Taking Tai'an City as an Example [J]. Tourism Overview, 2019 (04). (in Chinese)

[11] Jiang Zhiping, Sun Xianchao, Zheng Wenbin, Construction of Tourism Statistics System Based on Mobile Communication Big Data [J]. Statistics & Decision, 2021 (21). (in Chinese)