Research on the Construction and Operation of the Statistical Analysis System of Cultural Tourism Industry of Shenyang

Xinna Zheng and Caiying Zhou
School of Economics and Management Shenyang Institute of Technology, Fushun, China

Abstract. This paper analyses the development status of the cultural tourism industry in Shenyang by extracting Shenyang’s cultural tourism industry data, establishing a statistical index system for the development of Shenyang tourism industry based on big data tools, and uses big data tools to collect massive amounts of data and break the traditional data sample size. Based on the big data mathematical model, the tourism market in Shenyang was predicted and analysed, and the bottlenecks of small, time delay and low accuracy were obtained. Finally, it proposes to improve the management strategy of Shenyang's cultural tourism industry, enhance the marketing strategy of cultural travel, strengthen the strategy of cultural travel services, and promote the high-quality development of the cultural tourism industry in Shenyang.

1. Introduction
Many foreign countries have already applied the application of big data to public services [1-3]. For example, during the 2012 London Olympics, through the analysis of changes in traffic data, the public was guided to adjust travel plans in time to ease traffic and crowd pressure during the event; the IGC research plan launched in Japan relied on the Internet and cloud computing to collect data resources. This data was further analysed and summarize to facilitate people’s daily lives. Asia-Pacific countries have strengthened research on technologies such as the Internet, cloud computing, and remote monitoring, and promoted the use of GPS, landscape navigation and other systems to monitor real-time and enhance the quality of smart tourism.

The immediacy, extensiveness and mobility of tourism statistics lead to the failure of traditional statistical methods. Therefore, in recent years, under the backdrop of the development of global smart tourism and the improvements of data technology, the role of big data in tourism statistics and tourism analysis has rapidly entered the research and practical application fields. The research on big data in tourism is increasing. In 2013, Qiao [4-6] proposed an innovative model of big data-driven decision-making in the “Big Data-Based Tourism Public Management and Service Innovation Model Research”, and advocated the use of big data technology to further optimize the quality of tourism services. In 2015, Liang [7-8] believed that big data mining is the core of smart tourism. Only by deepening the tourism big data can we realize smart tourism management, smart travel service and smart travel marketing. In January 2019, Chongqing released the “2018 Chongqing Tourism Big Data Report”, which is a case of big data application in regional tourism.

2. Research Methods
Based on big data technology, through data collection, data cleaning, index set formation, analysis model construction of Shenyang cultural tourism industry, this paper analyses the attributes and
behaviour characteristics of tourism personnel, realize the market evaluation of tourism development status in Shenyang, and find operational problems. This paper proposes a feasible solution to the problem.

1) Data collection

Use Python language and crawler technology to get travel information from Qunar.com, Cellular, Ctrip, etc., which has user evaluation data (comment + rating), community data (followers, fans), tips, and real-time user actions (click + Query), to providing basic data support for statistics and analysis.

2) Data cleaning

Mathematical models are used to organize the collected data, eliminate impurity, remove duplicate information, correct existing errors, and provide data consistency and security.

3) Establishment of indicator sets

Use the data, which including the number of tourists, days, consumption amount, source, destination, transportation, accommodation, attractions, weather, season, gender, age and other indicators, to set Shenyang’s city travel industry economic indicators and city travel industry social indicators.

4) Analysis model construction

The big data analysis model is constructed. The model is divided into four layers: hardware resource layer, data processing layer, big data analysis layer and application service layer. The analysis model is shown in figure 1.

![Figure 1. Big data analysis model.](image)

5) Analysis of characteristics of tourist personnel

Factors such as user gender, age, occupation, income, preferences, etc., Analyse the relationship between factors and the weight of various factors in the tourism industry.

6) Analysis of passenger behaviour characteristics

Tourism days, tourism methods, consumption categories (eat, live, travel, travel, purchase, entertainment, learning), consumption amount, word of mouth evaluation and other factors, the relationship between the analysis factors and the weight of various factors of the tourism industry.
(7) Analysis of economic indicators of Shenyangwenlv industry
(8) Analysis of social and ecological indicators of the cultural tourism industry in Shenyang

3. Research Results

According to recent surveys, the overall size of the domestic market is large and has always been the main market for tourism in Shenyang as described in table 1.

The main source of tourists is in the close distance market in Liaoning Province, and the radiation range is limited.

|                      | 2014   | 2015   | 2016   | 2017   | 2018   |
|----------------------|--------|--------|--------|--------|--------|
| Total annual income  | 1065.6 | 1221.2 | 583.7  | 660    | 759    |
| (100 million yuan)   |        |        |        |        |        |
| A-level tourist      | 65     | 74     | 100    | 111    | 111    |
| attraction           | families| families| families| families| families|
| Number of visitors   | 8305.6 | 9219.2 | 6401.1 | 7234.5 | 8257.5%|
| (10,000 person)      |        |        |        |        |        |
| Reception increase   | 10.7%  | 11%    | 11.9%  | 13%    | 14.1%  |
| rate                 |        |        |        |        |        |

There are many short-distance tourists, mainly for sightseeing. However, business travellers have a large passenger flow, high consumption levels, large proportion of catering and shopping expenses, and strong leisure demands; self-service leisure and smart travel will become the mainstream as described in figures 2 and 3.

From the perspective of regional tourism in the three provinces, Shenyang tourism resources are prominent in industrial civilization, history and culture. Thus tourism products can be developed differently. As a regional central city of the Liaoning Province, which has the largest economic aggregate, Shenyang is also close to Japan and South Korea and can provide a strong economic foundation and a tourist base for the further tourism development. At the same time, Shenyang’s climate is suitable for travel, which is conducive to establishing a tourism environment shared by the host and the guest.

Figure 2. Divided by destination.
Figure 3. Divided by way of travel.

4. Conclusion
Shenyang has a large and rich variety of tourism resources. Humanistic tourism resources occupy an absolute dominant position in the types of tourism resources, and the spatial distribution shows the characteristics of “circle layer distribution, near river and city”. Compared with its surrounding cities, Shenyang’s greatest advantage lies in the agglomeration effect, historical and cultural heritage and industrial civilization advantages of the national regional central cities. It is necessary to highlight the comprehensive main function of Shenyang as a national regional centre city. Through its complementary resources with the Shenyang Economic Zone and other surrounding cities, the brand co-construction, the line connection and other measures, the tourism linkage effect is promoted, and the regional cooperation is used to support Shenyang to build Northeast Asia International. Tourism in the city will not only be an innovative demonstration, it will also be a role model, leading the tourism industry in Liaoning Province and even the Northeast to go international.

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