

Analysis of Technical and Economic Research Model Based on Intelligent Transportation

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Keywords: Intelligent transportation; economics; blind number theory

Abstract: Combining with the current development status of the world's intelligent transportation industry, and analyzing its rapid development, this paper analyzes the impact of intelligent technology advancement on economic activities from the perspective of technical economics, and analyzes the intelligent transportation industry in terms of engineering construction from the perspective of traditional economics. In this paper, the uncertainty factor can greatly influence the actual situation of the correctness of the intelligent transportation planning scheme. The blind number theory is proposed to describe the maximum uncertainty information in the intelligent transportation planning. Under this system, the intelligent transportation scheme under different modes is evaluated. The comprehensive evaluation plan is obtained and the rationality and feasibility of the method are verified.

1. Introduction

Intelligent transportation system is an emerging science developed in recent years. It is advanced information technology, positioning and navigation technology, data communication technology, electronic sensor technology, automatic control technology, image processing technology, computer network technology, artificial intelligence technology. The operation management science and other comprehensive and effective application to the transportation management system is strengthened the connection between vehicles, roads and users, thus realizing the intelligent of transportation services and management. Under the guidance of comprehensive integration ideas, a "large-scale, all-round, real-time, accurate and efficient intelligent transportation management system is established. It is a multi-disciplinary and technical large-scale integrated system engineering, and the development of intelligent transportation systems to society. Life, national economy and urban construction will have positive and far-reaching effects, so countries around the world have researched and developed such intelligent systems.

The choice of intelligent transportation mode is an important part of traffic planning, and it is briefly introduced in the literature [1-3]. In recent years, research on intelligent transportation modes has achieved a series of results, and early research results have focused on theoretical research and algorithms of reliability. With the increasing emphasis on the economics of intelligent transportation, the comprehensive study of reliability and economics has become an important aspect of intelligent transportation mode research.

Among the intelligent transportation systems, the most representative ones are the Electronic Toll Collection (ETC) and the Vehicle Information and Communication System (VICS) [4-6]. From an economic point of view, these in-vehicle terminal equipment, roadside facilities, bank settlement systems, and back-office management systems have brought more than \$10 billion in economic benefits to Japan. Literature [7] introduced an intelligent transportation transition based on balance, and proved that the scheme can effectively reduce losses and have considerable economic benefits. Literature [8-9] through the model consequence analysis method to determine the changes in user density and distribution is the most important factor affecting the reliability of intelligent traffic. Therefore, the multi-objective comprehensive evaluation theory has gradually been introduced into the research of intelligent traffic wiring mode selection. The literature [10-11] comprehensively considers the investment, cost, external environment, feasibility and other factors to carry out

planning, and gives reasonable suggestions and measures for the corresponding planning.

This paper will consider various indicators of urban intelligent transportation mode from the perspective of technical economy, and give corresponding application measures and scope of application through analysis of various modes. In view of the current situation of intelligent transportation in China, the paper will mainly consider the two major aspects of reliability and economy. The paper will establish a comprehensive evaluation model based on the uncertainty of future planning regions. Detailed technical and economic evaluation and comparative analysis of urban is intelligent transportation.

2. Intelligent Transportation Economic Technology Analysis

The cost of the intelligent transportation line consists of two parts: the comprehensive investment cost and the operating cost. After the total cost is calculated, the “current value to annual value” method is used to convert the annual cost.

2.1 Intelligent transportation line cost

The calculation formula for the intelligent transportation line cost is:

$$Z = kLC_a \quad (1)$$

Where k is the line meandering coefficient, that is, the proportional coefficient of the actual line length is estimated by the ideal line length. For the unconnected wiring scheme, K takes 1 and C_a is the unit length line investment (million), and L is the line length (km).).

2.2 Intelligent operating expenses

The formula for calculating the intelligent operating cost is:

$$\Delta A = P * \Delta P_l * r \quad (2)$$

$$U = a\Delta A + U_1 \quad (3)$$

Where NF is the average annual cost of the line distributed within n years; Z is the comprehensive investment of the line; U is the annual operating cost of the line: the economic life of the line, the traffic line takes 3 years, and the cable line takes 40 years.

2.3 Comprehensive evaluation model

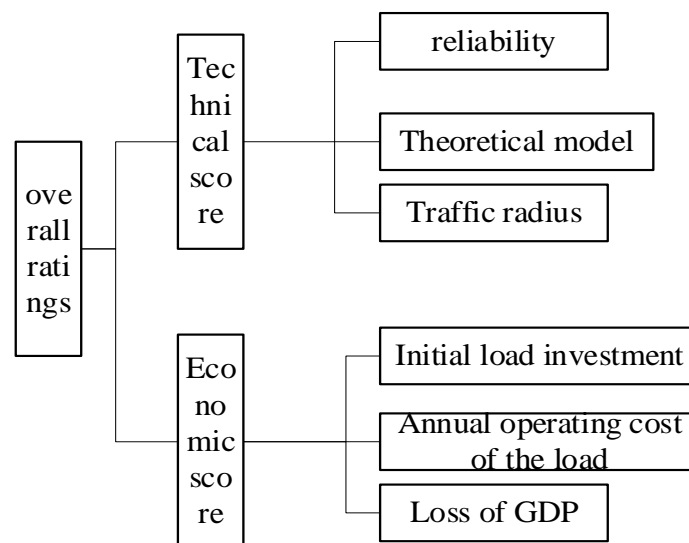


Fig. 1 Hierarchical analysis structure of traffic patterns

The principle of operation of the blind number theory is based on a multi-objective hierarchy diagram. The hierarchy diagram mainly includes: a target layer, a sub-target layer, and an indicator

layer. The final evaluation of the comprehensive evaluation is also to find the relative importance score of each alternative wiring mode scheme to the overall target, but the values involved in the calculation include the blind number expression of the uncertain factors, which can be calculated according to the weight of different indicator layers. The combined score of the wiring mode. Because the blind number calculation results contain different credibility results, in order to make the final comprehensive evaluation conclusions comparable, the self-calculated average results can be used to score the green combination evaluation.

The technical and economic indicators in the evaluation process of intelligent traffic connection mode are calculated according to the basic data, but the calculation methods are different because of the different meanings of each index. The dimensional difference of each index must be standardized. Therefore, linear quantitative methods can be used to quantify quantitative indicators. The number of non-dimension criteria for indicators is:

$$C_i = f_p(x_i) = \frac{x_i - m_i}{M_i - m_i} \quad (4)$$

According to the calculation formula of the final load and the construction cost, according to the calculation rule of the four numbers of the breeding number, the relevant operational technical indicators and economic indicators of the prospective intelligent transportation of the planning block can be calculated, and further, it can be concluded that the wiring is performed under a certain probability. According to the above model, not only the possible value range of various technical and economic indicators of the target intelligent transportation, but also the corresponding credibility distribution of each interval can be obtained.

3. Test Results

3.1 Scene

Based on the evaluation results of the typical intelligent transportation mode obtained from the previous analysis, the Wood Festival will use the actual data of a transportation company's urban network planning and construction to analyze the example and determine the actual intelligent transportation planning. The intelligent transportation service object is the entire traffic environment, including people, vehicles, roads and environment, and needs to rely on a large number of hardware devices to achieve. From a human point of view, in the information age, personal mobile devices have become the main concentrated area of Internet traffic, and began to assume the mission of providing traffic environment with personalized transportation services. From the perspective of the car, the vehicle is an important link of the entire transportation system, and the intelligence of the traffic is closely related to the intelligence of the vehicle. The use of a large number of advanced technologies can make vehicles safer and more user-friendly. And roads and traffic environments, such as induced information boards, electronic police, and traffic information collections everywhere is on the road. Equipment, detection devices and sensors, intelligent signal lights, etc., are objective conditions for traffic environment to accept ITS services, and are the basic facilities for ITS to function.

Intelligent traffic engineering is different from other engineering projects and has the dual attributes of investment and public welfare. Its characteristics are mainly reflected in the following No. First, it belongs to the basic engineering of the country and has the continuity of investment. It is a long-term and large-scale investment project. It is not a company or individual that can independently invest in it. Second, it is often higher. The scientific and technological content of the general municipal department could not be independently developed and implemented, and it needs to be completed in cooperation with various scientific research institutions or professional companies in the society. Third, the project has a long return period and requires a large amount of investment and long-term construction. Earlier investments guarantee continuity and are best idle funds.

Although intelligent transportation engineering has the characteristics of large investment, slow

effect and high engineering difficulty, it is also a project with great investment value in terms of long-term development income, mainly in the following points: First, to promote consumption It plays a very large indirect role. Secondly, it has economic functions that provide guarantees for social production and life, such as optimizing logistics distribution and reducing the cost of transporting goods. This economic function is directly exerted; third, the most direct Economic efficiency is the entry into the production field. This is the most obvious and practical performance of intelligent transportation engineering, and it is the dominant performance of its economic value.

In the comprehensive evaluation, the guideline requires the index to be 0.7~0.8, taking into account the actual situation and the previous measured value of 0.7.

Table 1 Intelligent traffic saturation load forecast results

A area load forecasting							
Serial number	region	load	Number of vehicles	Serial number	region	load	Number of vehicles
1	K1	700	345	2	K2	1350	386
3	K3	850	345	4	K4	1100	386
5	K5	1350	345	6	K6	1100	386
7	K7	1350	190	8	K8	1100	345
9	K9	1460	385	10	K10	1350	360
11	K11	1500	369	12	K12	1460	372

B area load forecasting							
Serial number	region	load	Number of vehicles	Serial number	region	load	Number of vehicles
1	K1	1350	345	2	K2	1100	366
3	K3	1350	345	4	K4	1350	366
5	K5	890	345	6	K6	1460	386
7	K7	950	190	8	K8	1200	315
9	K9	1360	385	10	K10	1250	362
11	K11	1500	369	12	K12	1360	322
13	K13	1430	334	14	K14	1420	380

C area load forecasting							
Serial number	region	load	Number of vehicles	Serial number	region	load	Number of vehicles
1	K1	780	289	2	K2	1200	326
3	K3	1350	345	4	K4	990	335
5	K5	990	359	6	K6	1460	386
7	K7	1200	190	8	K8	1200	315
9	K9	1360	385	10	K10	1250	415

According to the membership function of each indicator, the scores of each indicator can be calculated. By calculation, the final scores of schemes 1 to 3 are: 0, 809, 0.873, 0.902. The comparison of the final scores of each program is shown in the figure below.

3.2 Economic evaluation

Area A uses 4x6 network connection. If the A area considers the design of two handle ring nets, the design should consider 50% spare capacity. If all lines are in 2*300 mode and the economical current carrying capacity is about 400A, then the return line can have the maximum active load of $\sqrt{3} \times 10 \times 400 \times 0.9 = 6235$. The intelligent traffic outlet requires more double-circuit circuits than the 4x6 network, and the other parts are the same as 4*6. The length of the outlet is calculated according to 600 meters and the cable price is 300,000/km. The 4X6 network can save an investment of 720,000 yuan. Considering the annual operating costs, the optimal operation mode of the handle ring network is the same as that of the 4X6 network. The cost savings are 20,000 yuan. If you do not

consider the value of re_j , you can save a total of 1 million yuan. If you consider the time value of funds, you can save about 900,000 yuan.

Area B still uses 4*6 network wiring. If the B area considers the design of two handle ring nets, the design should consider 50% of the spare capacity. The handle ring network needs two more cables than the 4x6 in the substation outlet, and the other parts are the same as the 4x6 network. The length of the outlet is calculated according to 600 meters and the cable price is 300,000/km, saving an investment of 720,000 yuan. Considering the annual operating costs, the optimal operation of the handle ring network is the same as for the 4x6 network. The annual operating cost saved 24,000 yuan. If you do not consider the time value of funds, you can save a total of 1.08 million yuan. If you consider the time value of funds, you can save about 940,000 yuan.

Since the technical and economic characteristics of different wiring modes are considered in each load growth stage, the optimal solution is selected as much as possible, so there is a great advantage in saving investment. Through the analysis of the schemes of A and B, it is expected to save 2 million yuan in the construction of intelligent transportation.

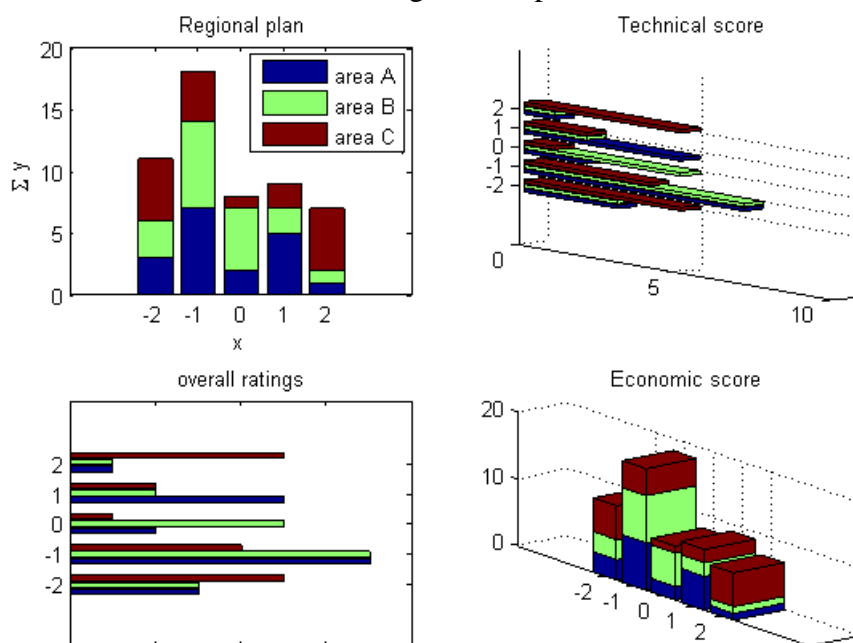


Fig. 2 Regional economic and comprehensive scores

4. Conclusion

Based on the concept of blind number theory, this paper first establishes an intelligent traffic area evaluation model with parameters as gray area. Then, from the perspective of the coexistence of various uncertainties such as intelligent transportation cost, the system parameter parameters in a specific environment are defined. On this basis, by self-numerating the above parameters, a comprehensive evaluation model of intelligent traffic mode under informatization is established. The case study shows that the study of intelligent traffic wiring scheme is based on the theory of blind number and comprehensive evaluation theory. It is theoretically feasible and the calculation result is credible. And the evaluation of its economic indicators, which provides more rich and useful information is for the final program determination, which is difficult to achieve by the conventional deterministic evaluation model.

Acknowledgements

The research in this paper was supported by The National Social Science Fund of China:

Research on Promoting Middle-income Income Growth in Qinghai-Tibet Region (NO. 17BJY041)

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