RESEARCH ON EVALUATION OF LOCATION PLANNING FOR URBAN PUBLIC SERVICE FACILITIES BASED ON GIS SPATIAL ANALYSIS *

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Abstract:

By the year 2008, the urbanization rate in China reached 45.68% (from National Bureau of Statistics of China), which was predicted to 70% by the year 2050. It means that a great deal of population will swarm into cities. Demands for urban infrastructure and land use, therefore, will change rapidly and drastically. Along with the changes of demands, most urban planning should be regulated or remade. Urban public service facilities, especially the public welfare facilities, are closely related to daily life of people, the location planning of which should be paid more attention to.

Location planning for urban public service facility is very complex and influential profoundly comparing to other urban planning contents. During practical work, there are different spatial classes even for the homogeneous facilities, such as planning area, piece area, residential district and residential quarter. In different spatial dimension, citizens will choose different traffic tools. For example, most people will choose vehicle traffic when go to general hospital, while choose pedestrian traffic when go to community clinic. Therefore, the location planning for urban public service facilities should take person's choice of traffic mode into account.

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Meanwhile, the traditional urban planning methods could not be suitable for the new situation with the conditions changing rapidly and drastically, and new methods and technologies are demanded. Therefore, GIS (Geographic Information System) is paid more attention to by decision-makers and planners for its ability of processing spatial information and displaying it visually. At the same time, there are some limits to the general GIS platforms. First, the network analysis is based on the road centerline, which is not suitable in residential district. Moreover, the analysis result is only one optimal route, which could not deal with complex analysis.

According to the analysis above, evaluation methods of urban location planning for public service facilities based on GIS spatial analysis are studied. A new kind of traffic network system is proposed, which is composed of both vehicle traffic and pedestrian traffic. As well as new network analysis methods based on the new traffic system are rebuilt. And the new methods could manage the complex analysis of location planning for urban public service facilities in different dimension and different class.

Firstly, the new traffic system is introduced in detail. Vehicle traffic network adopts the same municipal road centerline as general GIS platforms do, which is suitable for analyzing urban public service facilities with higher spatial class. Pedestrian traffic network is a new type of traffic network proposed for practical work, which is suitable for analyzing urban public service facilities with lower spatial class. Both vehicle traffic network and pedestrian traffic network compose of the foundation for network analysis.

Secondly, the pedestrian traffic network is elaborated further since it is a new kind of foundation for network analysis. The pedestrian traffic is composed of several pedestrian traffic facilities: footway, zebra crossing, overpass and subway. There are three methods to create pedestrian traffic facilities. (1) In larger dimension where exists municipal road, footway and zebra crossing are created automatically according to road centerline. (2) In smaller dimension without municipal road, the footway is created automatically by some rules according to land parcels. (3) In some local range (such as park, freeway, etc), the pedestrian traffic facilities could be created by interactive drawing. Showed as Fig. 1, all pedestrian traffic facilities created by the three methods mentioned ahead are combined to the final pedestrian traffic network.

Thirdly, based on the new traffic network system, composed of vehicle traffic and pedestrian traffic, a series of algorithms are rebuilt, such as the algorithm to create pedestrian traffic facilities, the algorithm to create mark points of land parcels on traffic network, the algorithm to estimate the accessibility of land parcels, the algorithm to return the shortest route, and the algorithm to ascertain service area for a facility, etc. Moreover, according to the practical application in urban planning work, the algorithms are optimized to improve the analysis efficiency.

Finally, the new traffic system and new network analysis methods are used in location planning analysis for urban public service facilities in Huanghua City, which assistant planning and decision-making. Planners revise the location planning scheme of Huanghua City according to the quantitative spatial analysis results. Due to considering the influence of people's choice of traffic mode, the analysis results employing the new network and methods are more congruous to reality, and get better application results, which prove the rationality and effectiveness of the new traffic network and new methods put forward by this research.

Keywords: Urban Planning, Public Service Facility, GIS, Network Analysis

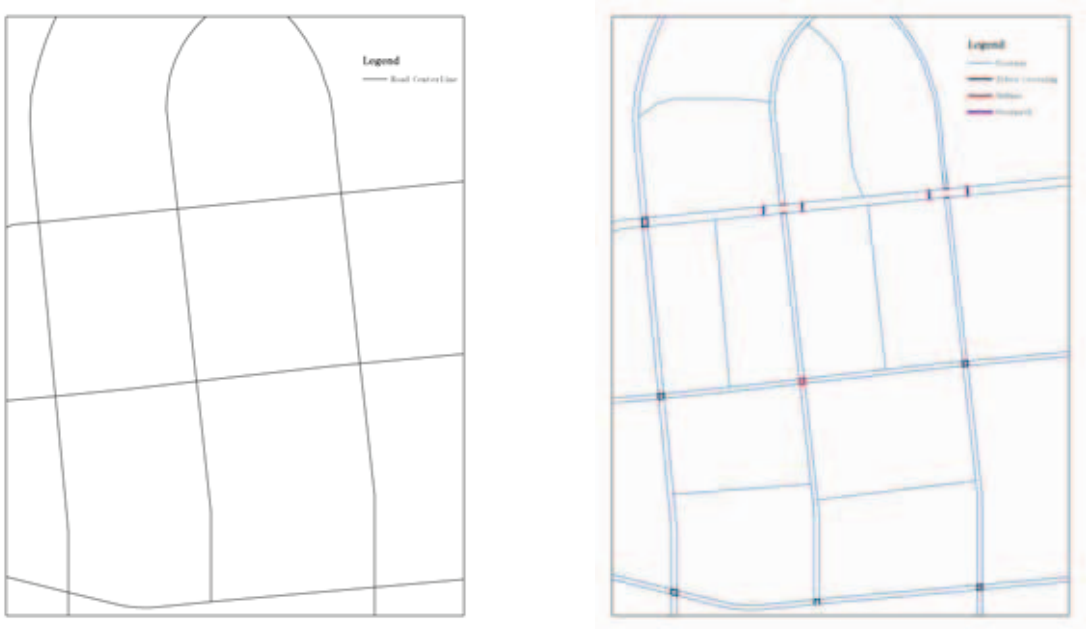

Fig. 1 Vehicle traffic network and pedestrian traffic network

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