Research on Saving and Intensive Evaluation Indicator System of Rural Infrastructure Construction

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Abstract. This paper proposed an indicator system to the saving and intensive of infrastructure. The evaluation indicator system was built from three dimensions - transportation facilities evaluation indicator, water supply and drainage facilities evaluation indicator, safety and disaster prevention facilities evaluation Indicator. The saving and intensive extent of rural infrastructure would be quantitatively evaluated by this indicator system to build livable living environment.

Introduction

Existing research of saving and intensive evaluation indicator basically focus on in urban areas with high concentration of resources. Most of them take land use as research objects, which lead to omit the research on villages. Disorderly and lowly intensive construction of rural generally caused two extreme results - infrastructure allocation is low/zero or overdone, humane living environment is not humanized and resources are wasted [1]. From this perspective, research to intensive on village level has importantly practical significance. This paper committed to establish infrastructure evaluation indicator system.

Saving and intensive evaluation indicator system of rural infrastructure

Infrastructure is mostly permanent construction which is long duration, large investment and high risk[2].The World Bank pointed out that in order to respond to some social issues such as social stability, rapid urbanization, climate change and natural disasters, food and energy security, departments need to be linked through infrastructure's complexity and connectivity [3].

Conformed to the high demand by new urbanization for the intensive use of resources, it is necessary and urgent to build the index system for saving and intensive of infrastructure [4]. For its unique nature and urban evaluation system to distinguish, research on village differs from that in urban. This paper attempts to establish an indicator system of rural infrastructure construction to provide a quantitative evaluation method to evaluate the intensive degree of rural infrastructure.

In this paper, infrastructure sharing rate evaluation system were proposed with three aspects - transportation facilities evaluation indicator, water supply and drainage facilities indicator, safety and disaster prevention facilities evaluation indicator. The infrastructure sharing rate evaluation system could be set in accordance with Table 1.

Table 1 Infrastructure sharing rate evaluation system

Target Layer	Criterion Layer	Evaluation Layer
Saving and Intensive Evaluation Indicator System of Rural Infrastructure Construction	Transportation facilities evaluation indicator	Road quality indicators
		Traffic indicators
	Water supply and drainage facilities indicator	Resource utilization
		Structures sharing rate
		Facilities coverage
	safety and disaster prevention facilities evaluation indicator	Flood control
		Firefighting
		Relief lifeline engineering
		Peace and disaster combined

Complexity and connectivity evaluation indicator system on rural infrastructure

Transportation facilities evaluation indicator. As one of the most important construction projects, transportation facilities are prerequisites for regional development. Furthermore, rural road infrastructure is an important indicator to evaluate the development of socio-economic. Existing road infrastructure in rural areas is insufficient and fragmented which leads to disconnection between village and village, villages and regional center. As a result, the development of the region is hesitated. Considered to build road quality indicators with area density of road network, road paved rate and road greening rate. In the same way, build traffic indicators with road network load degree, connectivity rate and mastery rate. Transportation facilities evaluation could be set in accordance with Table 2.

Table 2 Share-ratio-based indicator system for the assessment of road transport infrastructure

Target Layer	Criterion Layer	Evaluation Layer	Index Description
Road transport infrastructure sharing rate index	Road quality indicators	Area density of road network	The total length of roads / The total land area
		Road paved rate	Road surface has hardened area / The total area of the road
		Road greening rate	Reach the green standard of the road edge area / The total area of the edge of the road
	Traffic indicators	Road network load degree	Actual traffic / Capacity
		Road Network Connectivity	$C=\frac{\sum_{i=1}^{n} m_i}{N}$
		Road network accessibility rate	The sum of the number of residents in points and patches of land to meet the transport needs of the road / Residents sum of points and number of patches of land

The Water supply and drainage facilities evaluation indicator. Water supply and drainage facilities evaluation is evaluated from three levels –resource utilization, structures sharing rate,

facilities coverage. Taking into account both indicators and access to data, water supply and drainage facilities evaluation could be set in accordance with Table 3.

Table 3 Share-ratio-based indicator system for the assessment of water supply and drainage facilities infrastructure

Target Layer	Criterion Layer	Evaluation Layer	Index Description
Water supply and drainage facilities evaluation	Resource utilization	Effective irrigation rate	Effective irrigation area / Arable land
	Structures sharing rate	Per capita occupancy to water pipeline	The length of water pipeline / The number of actual coverage
		Per capita occupancy to drains	The length of drains / The number of actual coverage
	Facilities coverage	Water supply network coverage	The number of people covered by water supply network / Total population
		Drainage network coverage	The number of people covered by water drainage network / Total population
		Sewage collection and treatment system coverage	The number of people covered by sewage collection and treatment system / Total population

Safety and disaster prevention facilities evaluation indicator. Build safety and disaster prevention facilities evaluation indicator comprehensively from four indexes - flood control, firefighting, relief lifeline engineering, peace and disaster combined. Considering to the index data access to factors, safety and disaster prevention facilities evaluation could be set in accordance with Table 4.

Table 4 Share-ratio-based indicator system for the assessment of safety and disaster prevention infrastructure

Target Layer	Criterion Layer	Evaluation Layer	Index Description
Safety and disaster prevention infrastructure sharing rate index	Flood control	Flood control equipment building rate	Number of build equipments / Number of equipments have been built
		Drainage facilities building rate	Area of drainage facilities covering / Area of administrative region
	Firefighting	Fire exits connectivity	Width of more than four meters of road length / The total length of roads
	Relief lifeline engineering	Per capita area of relief square	Area of relief square / Resident population
	Peace and disaster combined	Usage of disaster prevention park/square in peace	Time per visitor stay in relief square for once / Resident population

Summary

The main objective of infrastructure construction in rural area is upgrade of existing facilities. This paper proposed the scheme of the evaluation indicator in three dimensions with six aspects - transportation facilities, water supply and drainage facilities, energy and power facilities, post and telecommunications facilities, ecological environment facilities, safety and Disaster prevention facilities. Through establishing a scientific conservation and rural infrastructure construction intensive evaluation

indicator system, investigate and quantify the way for the construction of country to guide the building of beautiful towns and villages.

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