Decision-Making Analysis on the Mode of Municipal Solid Waste Transfer-Nantun County as an Example

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ABSTRACT

In reviewing the result of national garbage disposal project of 2003, the Environmental Protection Administration (EPA) set out to launch in the following year a “3-Year Action Plan Toward Environmental Protection Policy” in order to establish national waste management policy in a new direction of “Reduction of Waste Source and Recycling of Resources.” By adopting the strategy of “All Garbage Sorting and Zero Waste,” the new action plan aims to recycle and utilize reusable resources through green production and consumption, reducing of garbage source, recycling and reuse of resources. The EPA’s goal is to attain a nationwide full garbage recovery and zero waste. Although the construction of initially planned incineration plant to be located at Jiji Township of Nantou County had been terminated under the administrative order issued by the Executive Yuan on May 25, 2004, problems relating to ineffective disposal of garbage are now breeding out of the general waste continuously generated in Nantou County. Existing landfill sites in all neighboring townships and villages in the county are reaching full capacity and destined to be closed for further operation. The results are unreasonable high cost of garbage clearance and transport, traffic jam caused by frequent garbage trucks to and fro outside county disposal plant, and the worsening living quality suffered by residents along the traffic routes. Therefore, the planning and establishment of garbage transit stations and incorporating them into the whole clearance-and-transport system is imperative if we are to expect more efficient disposal and recovery of garbage, lower cost and smooth flow of traffic. Targeting Nantou County, this study intends to conduct analysis on the feasibility, technical and economic cost efficiency of establishing garbage transit stations, and to establish a specific methodology and theoretical framework. To understand issues involved in the economic efficiency of two projects (a central singular county transit stations and three regional transit stations), Internal Rate of Return (IRR) of both projects are then assessed with feasibility of financial planning. All resultant contents of assessment are compiled in the questionnaire of expert survey to provide reference for surveyed experts and scholars to make comparison between various economic factors before filling in answers. Finally, after integrating all returned questionnaires, Expert Choice and Analytic Hierarchy Process (AHP) are employed to conduct synthetic analysis on the strength and weakness of the two projects Findings drawn from financial feasibility analysis indicate that charge imposed by singular transit station with an IRR range between 0%~20% is estimated to be NTD 1,100~ 1,220 per ton; while charge per ton for regional transit stations is NTD 1,470~1,1720. Results of investment efficiency analysis indicate that singular transit station is a more favorable option producing higher economic and investment efficiency, when financial issue is the sole consideration for government’s decision-making between public-owned operation style and build-operate-transfer (BOT) style. Furthermore, this study uses four evaluating factors: environmental technology, economic element, social element, and policy condition; and eight criteria: engineering technique, second potential pollution, engineering construction cost, operational cost, locals’ acceptance, land acquisition, waste management policy and integration of regional development to design and construct questionnaire of expert survey. All responses collected from returned questionnaires are used to construct a pairwise comparison matrix. Computed outcomes from AHP software Expert Choice show that singular transit station (0.698) operation mode is a relatively favorable choice compared to regional transit stations (0.302). Among all options chose by experts, singular transit station tops as the foremost consideration. In future decision-making process of general waste transit mode, Nantou County government should rank “Locals’ acceptance” under the category of “Social element” as the topmost consideration in choosing station site. Among all items under the category of “Policy condition,” “Waste management policy” should be served as the basis in their seeking for a project with the most economic efficiency. Then they should put in effort to tackle with engineering problems accompanied the selected project and map out quality public facilities, to solve garbage disposal problems existing in the county. Keywords: Garbage Transit Station, Analytic Hierarchy Process (AHP), Internal Rate of Return

Keywords : 垃圾轉運站 ; 分析層級程序法(AHP) ; 內部投資報酬率(IRR)

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