Prioritization of Cities Implementing Pay-As-You-Throw Municipal Waste Fee System

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ABSTRACT

How to protect the environment was extensively recognized by Taiwanese as an important task in recent years. In order to promote the objectives of waste reduction, economic incentive, and user/polluter equality, the adoption of a quantity-based municipal waste collection system becomes a top priority under the newly established Zero-Waste Policy of Taiwanese Environmental Protection Agency. The purpose of this study is to apply the Analytic Hierarchy Process(AHP), based on various selection criteria, to prioritize cities in Taiwan which could implement the pre-paid volume-based Pay-As-You-Throw(PAYT) municipal waste fee system. Primarily due to their similarities of various political, social and rural aspects, seven candidates cities/ counties, namely Keelung city, Hsinchu city, Taichung county, Taichung city, Changhua county, Chiayi city, and Tainai city, were chosen for this study. A four-layer decision-making framework was constructed under the AHP methodology: the first layer (goal layer) defines the research purpose which is to prioritize cities in Taiwan implementing the volume-based Pay-As-You-Throw municipal waste fee; the second layer(influence layer) chooses four major influence factors, namely environmental aspect, social aspect, economic aspect, and administrative aspect with respect to candidates cities; the third layer, contemplated as the criterion floor, addresses various assessment factors under each influence factor; the fourth layer outlines seven options/candidates of cities of this undertaking. Four sub-factors, i.e. Dioxin emission, waste reduction, environmental sanitation, and total environmental load, were chosen under the environmental aspect.Four sub-factors, i.e. quality of life, environmental agony index, citizens' supporting rate, and citizens' education level were selected with respect to the social aspect. Four sub-factors, i.e. economic incomes, total waste collection cost, waste fee, and environmental protection budget, were outlined under the economic aspect. Four sub-factors, i.e. local political profile, the size of environmental manpower, execution capability of local government, and equipment/machines allocation, were chosen with respect to the administrative aspect. Fifteen experts familiar with the municipal waste issues, roughly evenly spread among academic, governmental, and engineering institutions, were invited to participate in the AHP questionnairing process. Communication with the experts was made on an individual basis along the questionairing process in order to assure the validity and stability of each questionnaire. Study results indicated that cities with metropolitan characteristics, such as Tainai city(20.7%), Taichung city(17.8%), and Hsinchu city(16.4%) which seemingly have more dynamic economic activities, stronger administrative resource, denser population, and better educated citizen supporting PAYT system and environmental issues, should have priorities to implement the PAYT municipal waste fee system. The importance of the weighted value of each aspect was sequenced aS social aspect (29%), economic aspect(28%), environmental aspect(20%), and administrative aspect(22.6%). The degree of citizens' support(37.7%) and the impact of waste collection fee(33.7%) are two top criteria factors. Sensitivity analysis results showed that none of the four influence factors would cause significant impact on eventual AHP selection result. That is to say, the significance of each influence factor spreads quite evenly in this AHP decision-making model. In order to render local government a better reference, a case study and corresponding SWOT analysis was also conducted for one of the priority city, Taichung City, to address prospective opportunities and foreseeable risks associated with the introduction of the PAYT system. During the course of implementing the PAYT system in coming years, the degree of citizens' support and the impact (the immediate pre-paid of the plastic bags for the users/polluters vs the waste fee "hidden" in the water bill as widely adopted in Taiwan for years) of the waste collection fee are two principal factors to be coped with for the local government.

Keywords : Pay-As-You-Throw(PAYT), Analytic Hierarchy Process(AHP), sensitive analysis

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