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運輸建設計畫之整合性評估
–坪林交流道之個案研究

An Integrated Evaluation of Transportation Infrastructure--A Case Study of Pinglin Interchange

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摘要

在目前的交通運輸評估的方式當中，多數的政府都是以環境影響評估搭配成本效益分析的結果作為主要的決策參考依據。交通建設對環境的影響不能與其他的影響效果不能放在同一天平上作評量，係肇因於過去缺乏將環境財貨貨幣化的方法。近年來，環境財貨估價的方法日趨成熟，故本文擬建立一個整合環境財貨價值的成本效益分析架構，改善過去成本效益分析無法納入環境影響效果的缺失。

在眾多環境財估價方式當中，假設市場評估法是唯一可以同時估計市場財貨及非市場財貨的方法，尤其適合運用於涉及多種環境影響的交通運輸計畫。然因假設市場評估法的操作方式多元，且需逐一矯正工具偏誤，因此本文將以實例驗證，逐步地執行操作方式，探討各個步驟當中應該注意的課題。並將假設市場評估法所推估出的環境財貨貨幣價格納入成本效益分析架構中，重新檢視環境財貨貨幣化對既有成本效益結果的影響。

本文係以坪林交流道作為案例分析，根據政府所做的成本效益評估顯示，若是開放坪林交流道不作任河流量限制實，則每年可以創造社會總體效益為 5.5 億元台幣；但經本文估算環境成本，並且納入原來的成本效益分析，結果發現與政府所做的分析呈現完全相反的結論。根據本文的估計，開放坪林交流道每年會對社會總體造成新台幣 19 億元的負擔。

這個實證結果顯示，現行使用環境影響評估搭配成本效益分析的決策分析方式，無法有效達成社會效益極大化的政策協助效果，更可能發生完全相反的決策建議。規劃者實有必要發展一套整合假設市場評估法與成本效益評估的政策架

構，彌補現行分析技術的缺失。

政府在從事公共建設之際，其主要的目的是要創造社會總體效益的極大化，然在社會效益增益當中所造成的分配不公平，也是政府必須同時解決的問題。然而在過去經驗中顯示，政府的確忽略了這個部份。這正是為何常常發生政府立意良好的建設，卻造到所謂「受害」民眾攔街抗議的景況。

本文更進一步將成本效益分析法從社會總體結果論之視野，移轉到利益團體的效益分配的角度。本文將交通建設計畫可能的影響及其各自關聯的團體建立對應關係，並以利益團體為主體來進行成本效益的收納。透過這個對應與歸納的架構，可以清晰勾勒出在特定的交通建設計畫中，成本與效益可能由不同的團體來負擔。由於有著貨幣價格的依據，政府可以利用經濟手段進行社會利益重新分配，從而避免社會效益建築在犧牲少數人利益的困境。

根據本文實證分析的結果，若對於使用坪林交流道的使用者課以使用費，則可以減少 25%的使用人次，降低坪林地區的環境負荷。文中更進一步分析付費使用者的社經特性及其動機。結果顯示比較在乎交通建設會影響環境進而損害自身健康者(如女性及高收入者)，願付價格較高；而對政府執法無信心者(如私部門工作者、60 歲以上的長者及教育程度較高者)付費意願較低。這些資訊顯示，政府若以收費或課稅等方式進行重分配之手段時，必須讓施政對象了解政策對其直接的關連性及增加民眾對政府的施政信心。

最後本文幾項對後續研究者的建議，1.可以同時採取多種詢價方式，由此勾稽彼此的結果，可以提升估價的可信度；2.可以進行事前、事後的比較，藉以降低估價的偏誤；3.在問卷中要明定支付的載具，避免受訪者的誤解；4.建立敘述性偏好及實際性偏好資料間的關連性，可以提升敘述性偏好的可性度；5.在污染量的估計方面，增加運具的變相，可以提升估計的信度。

關鍵字：假設市場評估法，願付價格，雙價法

An Integrated Evaluation of Transportation Infrastructur --A Case Study of Pinglin Interchange

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ABSTRACT

The purpose of the study is to develop and experiment with an integrated cost-benefit model for an environment-sensitive transportation project. It is well known that the current methodologies of assessing environment-sensitive projects have limitations. In this regard, the widely-adopted exercise which involves the "Environmental Impact Assessment (EIA) and the traditional Cost Benefit Analysis (CBA) in a sequential way may be flawed with a failure to calculate the resultant economic and environmental impacts in a same setting and at the same time. Contingent Valuation Methods (CVM) could take environmental factors into account and by far is the most frequently applied methodology. However, the CVM mainly deals only with the environmental impacts, paying not much attention to the economic impacts and still falling short of expectations.

Given the above weakness it is necessary to develop a process which integrates the CBA with CVM to evaluate the overall effects. Consequentially, this study sets to go a step further than the previous research by developing a step-by-step process which integrates the CBA with the CVM to assess the overall effects (both the environmental and economic impacts) for a transportation project.

In studying this issue, the Pinglin Interchange appears to provide an interesting case. Although within this issue, such a high-profile case as Taiwan high speed railway, the biggest BOT case, is large in scale and draws much attention, this is obviously not the case in the Pinglin Interchange. However, the Pinglin Interchange does provide a manageable case to experiment with the development of an integrated CBA with environmental factors for an environment-sensitive project. Indeed, the

paper goes a step further than the previous research by exploring the issue at the practice level, which may hopefully be more insightful.

The empirical results show that an integrated CBA may produce an entirely different conclusion from the one resulting from the common evaluation exercise of combining the EIA and the traditional CBA. Specifically speaking, while the common evaluation exercise led to a favorable conclusion, in the case of the Pinglin Interchange, the net annual benefit was estimated at NT$550 million per year when the environmental effects are excluded. On the other hand, the results of our integrated CBA suggest that the construction of the Pinglin Interchange may not be cost-effective, in terms of the joint effects of the environmental and economic impacts. If the environmental effects are monetised and taken into consideration, the net deregulated effect will become negative NT$1,954 million per year.

By implication, an environmentally acceptable transportation project, such as the Pinglin Interchange, though is justifiable in terms of the EIA, may not necessarily be a social optimal project. Therefore, to make the socially optimal decision for an environment-sensitive project has been troublesome for the planners because they have to take into account both the resultant environmental impacts and economic impacts. Instead of developing something new, the study arguably has managed to find a short-cut to the above mentioned problem by integrating the CVM and traditional CBA on a same scale.

This study further examines the role of the use fee in controlling pollution. It is well known that levy user fees in environment sensitive area will normally lead to a reduction in the number of tourists, thereby reducing environmental pollution. In this regard, the study applies the DB-DC approach to evaluate the effect of collecting user fee on the number of tourists in Pinglin. The results show that the government could set user fee at NT$62 and could reduce 24% of the tourists and the level of pollution will be reduced accordingly.

In addition, the logic model is also used to examine the effects of socioeconomic characteristics on tourists' WTP. The estimated results demonstrate that female, high income, metropolitan residents, low level of

education, public employee and people under the age of 60 tend to have higher WTP. Moreover in-depth interview indicates that regardless of the socioeconomic characteristics, public's confidence in the capability of government enforcement affects people's WTP distinctly.

In summary, this study addresses the need to develop an integral plan for WTP approach in project appraisal. The results of this research can be transferred to other areas of policy-making definitely, such as recreation industry and transportation constructions which are trying to avoid environmental damages. On this regard, identifying interested parties motivations is a very key factor of enforcing public polices. It is necessary for the government authorities to recognize related parties' concerns and create fine communicative atmosphere. As a result, it could facilitate the process of pursuing sustainable development.

Finally, this thesis has shown that it is imperative to encompass a wide range of environmental factors in the project appraisal process. There are a number of issues arising from this work that require further exploration which includes: (1) extending elicitation techniques in CV approach; (2) controlling the survey period to mitigate bias; (3) identifying the tools of environment protection; (4) combining stated preference and revealed preference data; (5) pricing automotives as an alternative to alleviate pollution.

Keywords: Contingent valuation method (CVM), Willingness-to-pay (WTP), Double bounded dichotomous choice (DB-DC)

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