

沿岸開発による環境影響の価格定量と帰還効果分析 の手法に関する研究

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要 旨

沿岸開発における環境アセスメント・システムを「自然環境の変化の予測による開発事業計画の事前の修正という帰還効果」と「開発事業とそれによって影響を受ける自然環境の比較考量」という機構を持つ双方向的・多断面的なシステムと捉え、分析を行った。「帰還効果」を検証するため、港湾における埋立面積の時系列、水深分布、地理的経済的指標との因果関係の分析等の手法を当てはめ、埋立の特性の分析を行った。「比較考量」の精度を高めるために、船舶事故流出油対策を事例に、CVM のアウトプット特性の確認を行い、誤差・偏差の適切な補正の方法を検討した。

(1) 港湾埋立の規模・空間分布のマクロ分析

自己回帰モデルを用いたオイルショック以降の全国の港湾における埋立面積の時系列トレンドの把握、港湾計画情報を用いた水深帯ごとの埋立計画増加面積の推定、パス解析を用いた埋立の面積と水深に対する地理的経済的指標の因果関係の把握、を試みた。ここで用いたいずれの仕法も環境影響による帰還効果の一端を検知することに成功した。これにより、これらの仕法が沿岸開発に対する帰還効果の検出に一定の有効性を持つことを示すことができた。

(2) 船舶事故流出油対策を事例とした CVM の特性分析

船舶事故による油流出から海岸環境を守るための費用負担に、CVM を適用した。その結果から得られる情報をもとに母集団の提示額－承認率分布とその周りの誤差分布を仮定し、モンテカルロ・シミュレーションを実施し、サンプル数と支払意思額中央値の相対信頼区間の関係式を求めた。また、回答者の考慮範囲に限られる場合に、CVM によって推計される支払意思額の中央値が持つ偏りを補正するために、潜在的な同時確率分布が存在することを想定し、そのような場合における修正値として受入限度 (Acceptable Limit: AL) という概念を導いた。

キーワード：沿岸開発、環境影響、帰還効果、価格定量、自己回帰モデル、パス解析、CVM

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Methodology for the Valuation of Environmental Impacts and Feedback Analysis of the Effects of Environment Policy on Coastal Development

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Synopsis

Environmental assessment on coastal developments could be considered as the interactive and multiphase mechanisms including hidden two parts. First was "Feedback mechanisms of prior correction of development plans by forecasting the natural environment changes caused by the developments", and second was "Comparison of developments and natural environment changes caused by the developments". The techniques for analyzing the time series of reclamation area and the depth distributions of reclamation in port districts, and the technique of causality analysis of geographic, economic indices to reclamation properties, were applied analyzing the characteristics of reclamation to verify "Feedback effects". The output characteristics of Contingent Valuation Method (CVM) were clarified. The method of correcting the error and deflection of CVM was considered, using the ship accident oil spill measures, to enhance the precision of "Comparison of developments and natural environment".

(1) Macroscopic analysis of scale and space distribution of reclamation in port districts

The time trend of reclamation area in port districts across the Japan was studied, using Auto Regressive Model. An attempt was made to estimate the distribution of increase area in reclamation plans by the depth and understanding the causality of geographic, economical indices to the area and depth of reclamation by Path Analysis, were tried. Each procedure used in this study succeeded in the detection of the parts of feedback effects caused by foreseeable environmental impacts. These procedures were found to be definitely useful in the detection of the feedback effects to coastal developments.

(2) Analysis on the characteristics of CVM using ship accident oil spill measures

CVM was applied to the case of protecting coastal environment from oil outflow due to ship accidents. The price-approval rate distribution and error of the rate were assumed based on the information obtained by the case, and Monte Carlo simulation was executed. The equation of the samples number to the median of Willingness to Pay (WTP) was obtained. Additionally, for correction of the bias of the median of WTP estimated by CVM under limited scope of respondents, it was assumed that a latent joint probability distribution existed. The concept of Acceptable Limit (AL) was formulated as an adjusted value for that case.

Key Words: coastal development, environmental effect, feedback effect, environmental valuation, autoregressive model, Path Analysis, Contingent Valuation Method.

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