

# 捷運沿線土地使用變遷模擬模式之建構與應用

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## 摘要

土地使用變遷模式在都市研究領域一直是相當重要且複雜的課題，在規劃過程中，規劃者如果掌握土地使用的變遷與發展狀況，則對於都市規劃之研擬可提供很大的幫助。過去土地使用變遷相關研究多以靜態呈現為主，無法呈現每一時間點土地使用的狀況，而網格模式雖然具有動態特性，但其無法描述行為者之間所帶來的多變化結果。有鑒於此，本研究目的在建立動態且能描述行為者間互動關係的土地使用變遷模式，並應用於捷運沿線土地使用變遷之模擬分析。

本研究以多主體系統(Multi-agent system)為基礎，透過文獻回顧釐清影響土地使用變遷的因素，利用多元羅吉特模式之型式來建立土地使用轉換規則，及建構捷運沿線土地使用變遷模式。繼而本研究以地理資訊系統進行土地使用判釋與網格資料收集，並以 NetLogo 軟體作為模擬平台，應用所建立模式進行捷運新店線台北縣部份的實例分析。

本研究模擬捷運新店線沿線土地使用變遷之正確率達 90%，經由模擬結果發現商業使用會沿著捷運沿線呈現帶狀發展，預測未來土地使用變化在無政策下並不明顯，說明政策對土地使用變遷的重要。本研究進一步針對新店線進行政策分析，包括增加捷運沿線容積率、改善步行環境與模擬規劃中的捷運環狀線，結果發現增加沿線容積率，效果會呈現遞減；改變步行環境會使車站附近商業區範圍擴大，但政策效果最差；而捷運環狀線的興建會使捷運沿線的土地價值增加，商業使用呈現帶狀分佈，其政策效果最強。

關鍵字：土地使用變遷、捷運系統、多主體系統、細胞自動機

# The Simulation Model and Its Application of Land Use Change along the Metro Line

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## Abstract

Land use change model has been an important and complicated issue in urban research. If we can grasp the changes and development of land uses in planning process, it will provide much assistance in drawing up urban plan. The past research about land use change model mainly paid much attention on a static state, few on land use change situations through time. Although the cellular automata model performs dynamic feature, the model fails to display the changeable results which describe the behaviors among agents. On account of above reasons, this research aims at developing a dynamic land use change model, which can simulate the interactions among agents and forecast the land use changes along metro line.

The simulation model in this research was developed based on multi-agent system and the influence factors of land use change are explored from literature review. The land use change rule was formulated as multinomial logit model. The geography information system was applied to interpret land use and to organize data in terms of grid pattern. Finally, the NetLogo software was used as platform to simulate the land use change of Xindian Line in Taipei County.

In the case study, the accuracy rate of forecasted land use is 90%. The simulated results found that commercial use spreads along the metro line. According to the forecast results, the land use change is not significant without any policy. This research further performed policy analyses, which include increasing floor-area ratio along metro route, improving walking environment and introducing the Circular Line

of metro system. The policy analyses reached the following conclusions: (1) the effect of increasing floor-area ratio decreases with the increasing ratio; (2) improving walking environment expands the commercial areas in nearby metro stations but the policy effect is the worst; and, (3) the Circular Line will increase the land use value along the metro line, form the commercial land uses into belt-shaped distribution and perform the strongest policy effect.

Keyword : Land use change 、 Metro system 、 Multi-agent system 、 Cellular Automata

