

國立台北大學都市計劃研究所

博士論文

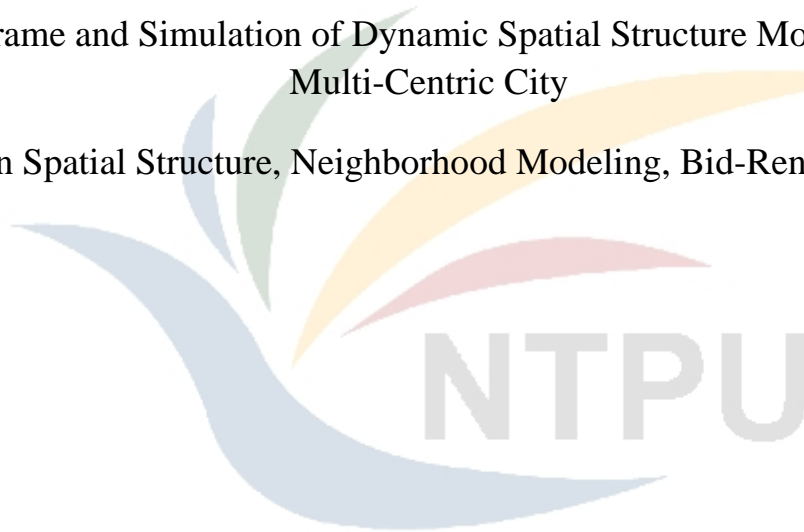
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多核心都市動態空間結構模式架構與模擬

-都市空間結構、近鄰模式、競租函數

The Frame and Simulation of Dynamic Spatial Structure Modeling for
Multi-Centric City

- Urban Spatial Structure, Neighborhood Modeling, Bid-Rent Function



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論文提要內容：

世界上許多的大都會區都來自小聚落，在都市化及都市蔓延的過程讓都會越來越大，如紐約、上海市及台北市。細胞自動體及競標地租等都市發展與都市經濟理論都沒有真正回應中地理論的多核心空間結構。本研究多核心都市動態空間結構模式架構(Dynamic Spatial Structure Modeling for Multi-Centric City, DSSM) 由系統論的方式組合都市內互動的部門，建立各部門的效用函數與生產函數，確立一般近鄰與門檻近鄰的條件；進行不同狀況的都市發展模擬，以瞭解都市核心層級狀況、渦輪發展(Turbo-cornutus)，與道路系統及公共設施配置等對都市多核心的動態分佈的影響。

初步以無道路的均質平原作模擬，並藉此建立整個模擬的架構；其次進行具有道路系統的模擬，此包含直角道路系統與非直角的道路系統；繼之為進行含有公共設施區位的模擬，研究都市核心發展受經常使用公共設施的影響；實際案例模擬，一以宜蘭市新縣政中心的發展作初步的模擬，研究新市區發展初階段時的使用者分佈狀況，二以宜蘭市文化中心地區進行歷史發展的模擬，驗證 DSSM 模型在低密度住宅社區與大學所在地曾經歷的發展。研究發現：由於中產階級及工商服務業的興起，家庭出現大量至核心的非就業旅次，其成本的降低為造成大都會的重要原因之一；由於核心-腹地的等租金曲線次遞形成的幾何現象，使得新高層核心得以出現與轉移；因為機會多及腹地呈現酪梨形狀的較一般位置腹地為大，讓幹道上容易出現高層級核心；道路的阻抗狀況影響核心-腹地的規模，讓周邊發展形成較小的核心-腹地；雖然公共設施接近核心可以更凝集核心，其設置不宜太近核心而影響核心規模；渦輪發展的三種狀況為環繞、迴轉與跳躍，特別當跳躍時容易形成高層級核心；最後，DSSM 模式在實際案例上有不錯的應用。

關鍵字：動態空間結構，近鄰模式，租金函數，核心腹地，及多核心城市

ABSTRACT

THE FRAME AND SIMULATION OF DYNAMIC SPATIAL STRUCTURE MODELING FOR MULTI-CENTRIC CITY

by

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With many megalopolises around the world have all grown from small settlements, the urbanization and urban sprawling process continues to expand the scale of a megalopolis, as seen in New York, Shanghai and Taipei. Urban development and urban economic theories, such as Cellular Automata and Rent Function, have not truly responded to the center place theory's multi-centric spatial structure. The dynamic spatial structure modeling for multi-centric city (DSSM) constitutes the urban interactive sectors using the system theory, sets up the utility function and production function of urban sectors, and creates the criteria of general and threshold neighborhood modeling. This study conducts different simulations to understand the effect for urban centers of hierarchical system, Turbo-Cornutus, and the allocation of roadway systems and infrastructure.

The model simulations were initially on a free plain without road framework, which is used to establish the simulation framework. Next is a simulation with roadway systems, which includes right angular and non-right angular roadway systems. And what follows is a simulation with infrastructure allocating, which is to study how urban center development is impacted by the frequency using infrastructure. In actual case analyses, case one concern with a preliminary simulation on the development of the County Administrative Center Area in Yilan City, which studies the state of user distribution during the initial stage of a new community; case two pertains to a historical development simulation on Yilan City's cultural center area, which is tested to validate how the DSSM in low-density residential areas. The study found: the reduced cost of family non-employment travel trips to urban centers have contributed as one of the crucial reasons of shaping a megalopolis; the geometry phenomenon formed by the iso-rentline has spawned the emergence and transfer of centers on a higher level of hierarchy system; the plentiful of opportunities and an avocado-shaped periphery that is larger than most ordinary periphery have created a greater tendency for centers on a higher hierarchy to take shape along the major roadways; the state of roadway impedance affects the scale of urban centers and periphery; the proximity of infrastructure is best not to allocate such facilities too close to the center to affect the center's scale; three types of Turbo-Cornutus are encirclement, reversal and leaping; lastly, the DSSM modeling has tested useful applications on the actual case studies.

Key word: dynamic spatial structure, neighborhood modeling, rent function, core-periphery, and multi-centric city