

Spatial Model of Medical facilities: a modification based on P-median model

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Outline of this presentation

Introduction

- ◆ Background
- ◆ Target and problem statement

Methology

- ◆ Literature review on 5 models
- ◆ P-median model

Investigation and Analysis

- ◆ General situation , status-quo of medical faculties in study area
- ◆ Field survey and modification of the P-median model
- ◆ Meaning of this modification : how to apply it ?

Conclusion and discussion





I. Background

- The distribution of major public service is required according to the newest “Urban Planning approach”
- Currently, the research of spatial distribution of medical faculties is still at early stage
- In accordance with the city’s, further study of the system of medical facilities to improve the resources optimization allocation and promote the health service is inevitable.

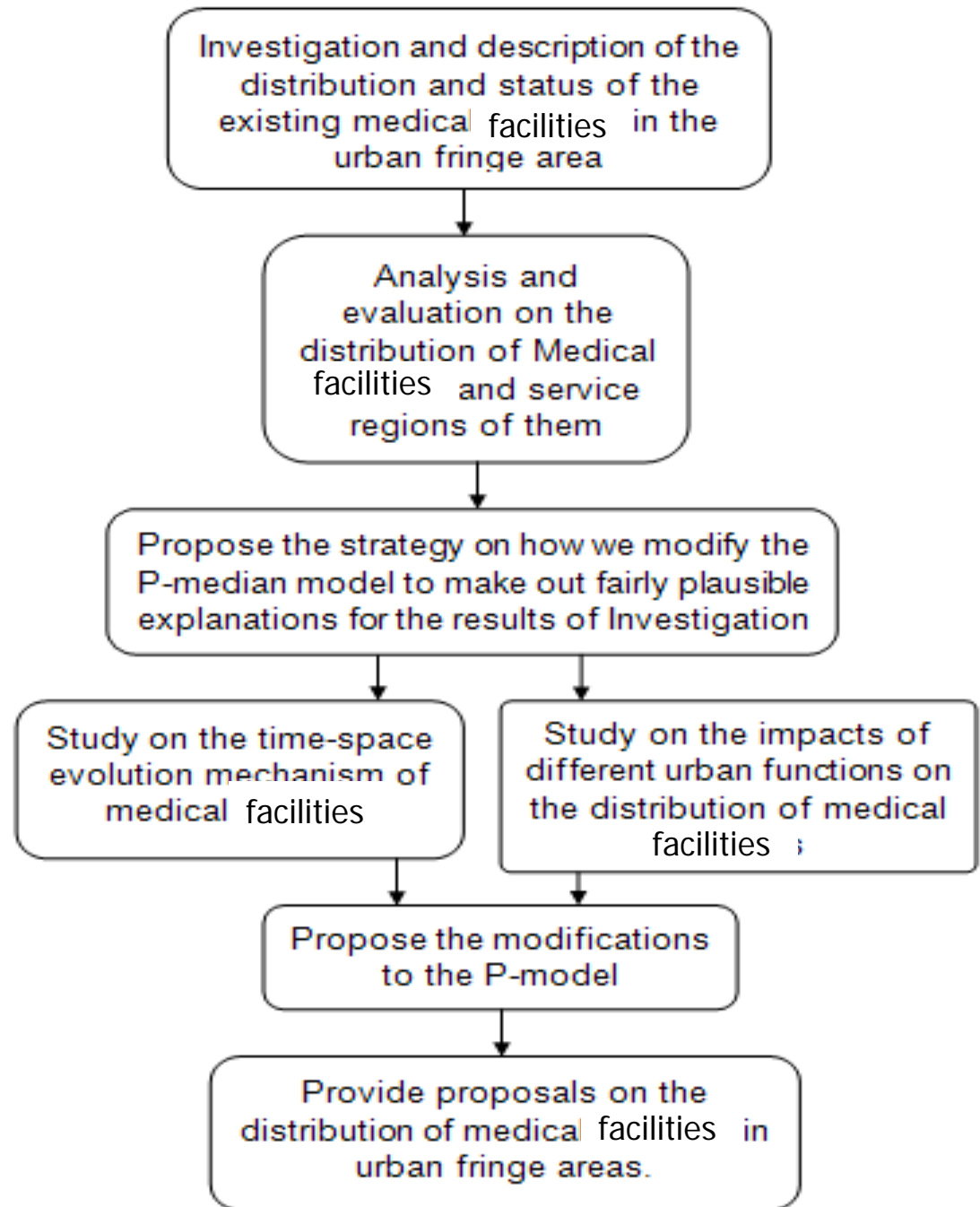
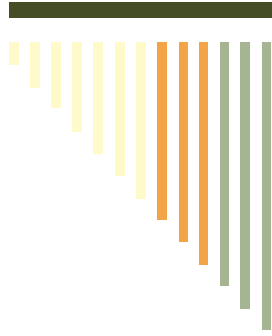




II. Target & Problem statement

- The central aim of this research is to examine the spatial distribution of health care facilities, and to develop a model that may be used to explain it.







III. Methodology : **Summary of methods**

5 classic models on distribution of medical faculties:

- P-median model
- Location set covering model
- Maximal covering model
- Hierarchical location-allocation mode
- Spatial interaction models

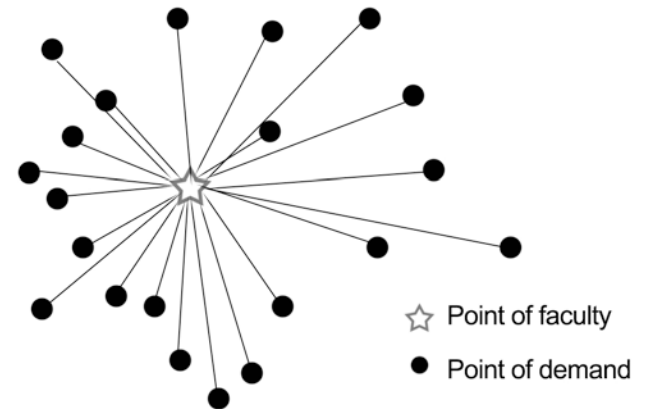


III. Methodology :Introduction to P-median model

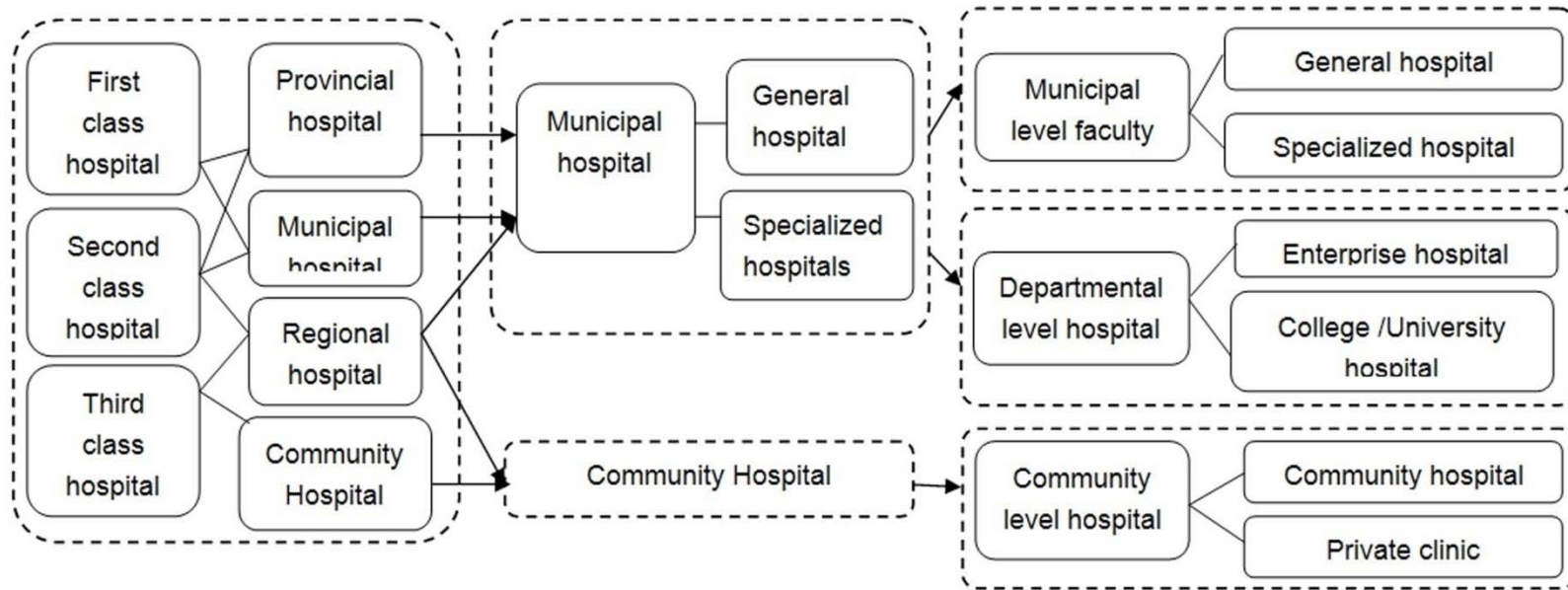
- Firstly proposed by Kakimi(1964),which claims that facilities should be arranged to meet the requirement that the sum of all the distance from the demand point to point P would be minimum under the given amount of point P

$$\text{Max} \sum_{i=1}^n a_i d_{ij} x_{ij}$$

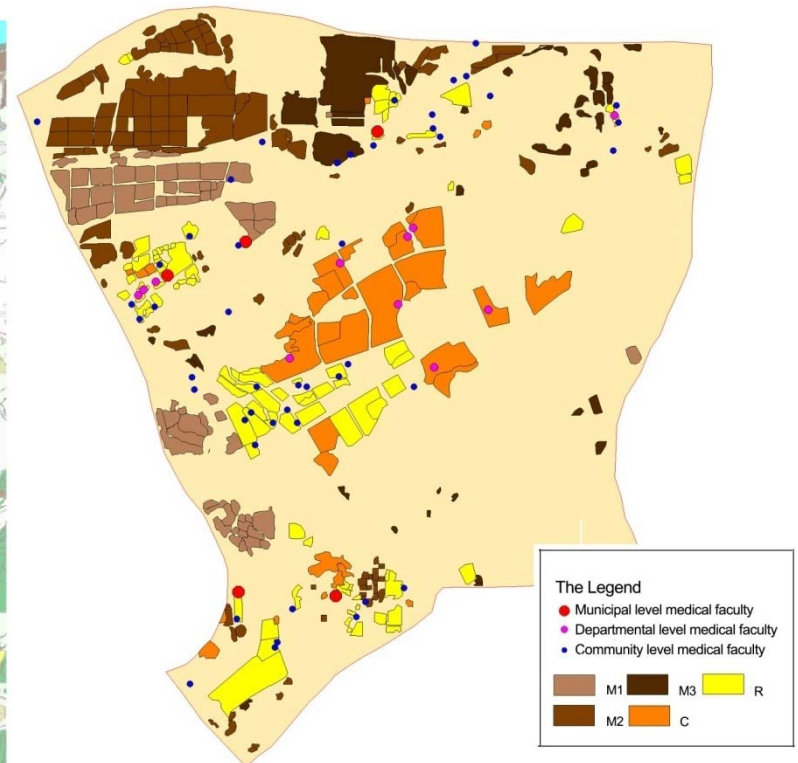
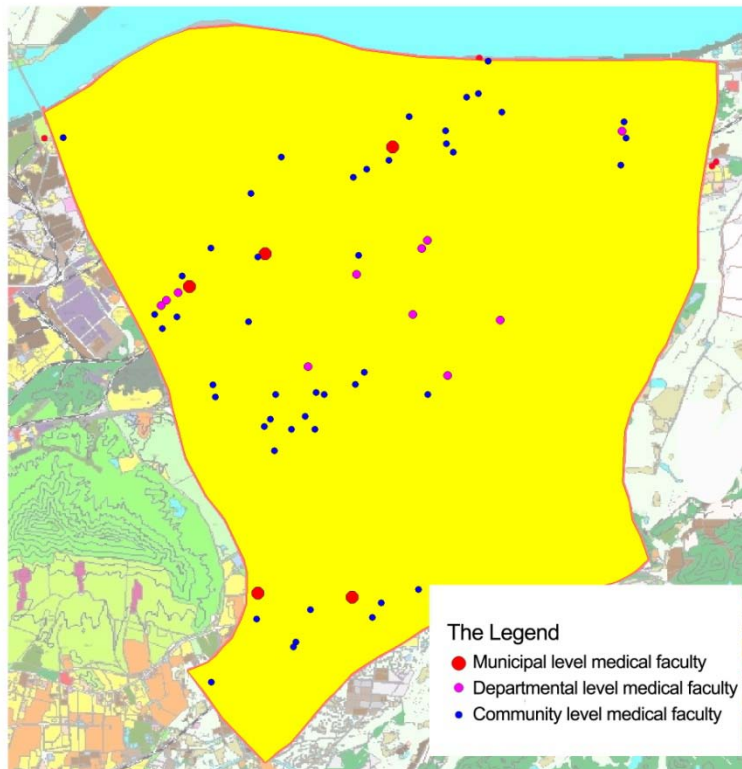
$$\text{s.t.} \begin{cases} \sum_j x_{ij} = 1 & (1) \\ x_{ij} \leq x_{ij} \quad \forall i, j & (2) \\ \sum_j x_{ij} = p & (3) \end{cases}$$



IV. Investigation and analysis: **categorization**

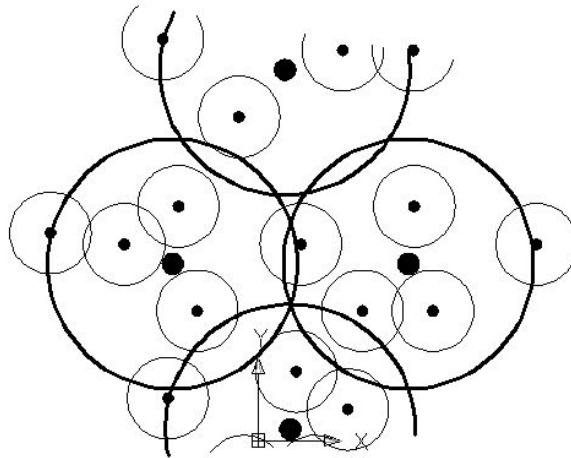


IV. Investigation and analysis: **status-quo of medical facilities**

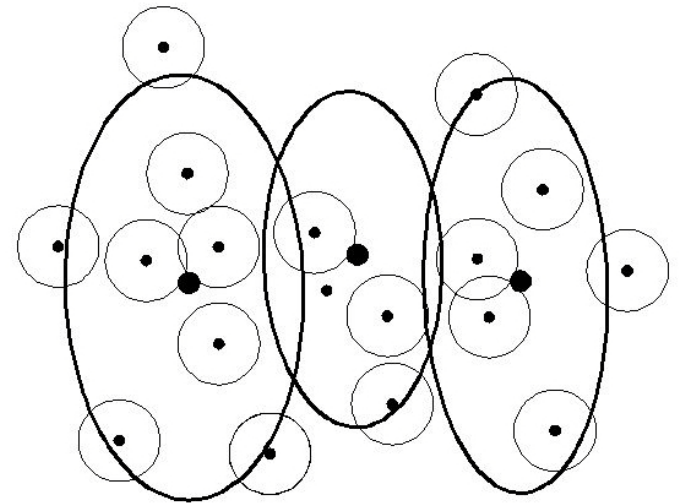




IV. Investigations and analysis: **study of service scope**



**Service Areas of facilities
determined by P-median model**



**Service Areas of facilities by
field survey**



IV. Investigations and analysis: **the modification of P-median model**

$$\begin{aligned} & \text{Max} \sum_{i=1}^n K_{ij} a_i d_{ij} x_{ij} \\ & \text{s.t.} \begin{cases} \sum_j x_{ij} = 1 & (1) \\ x_{ij} \leq x_{ij} \quad \forall i, j & (2) \\ \sum_j x_{ij} = p & (3) \end{cases} \end{aligned}$$

T_j^α Traffic factor

F_j^β Weight factor

S_j^γ Social factor

P_j^δ Policy factor

$$K_{ij} = T_{ij}^\alpha \times F_j^\beta \times S_i^\gamma \times P_j^\delta;$$





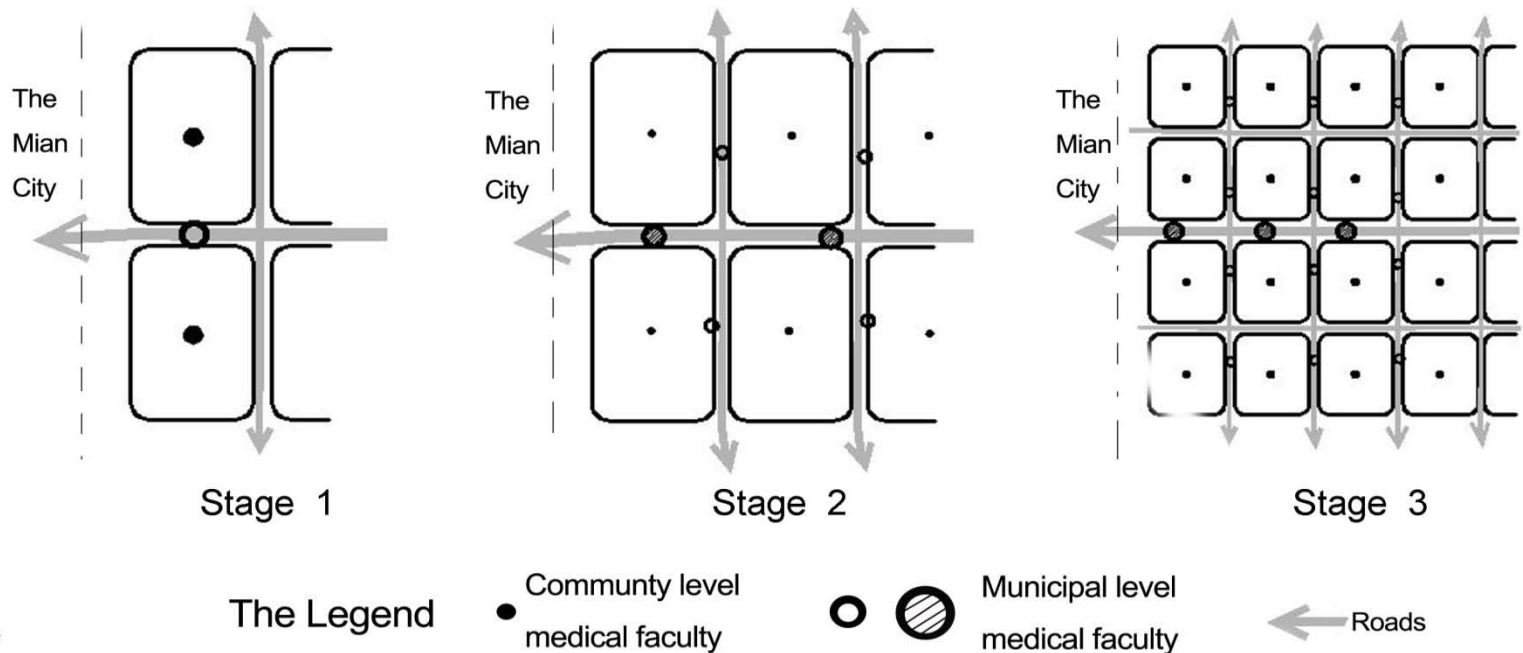
IV. Investigation and analysis: **the meaning of this modification**

- Explain the change of medical facility's service scope
- The advantage of vein-shaped distribution based on the modification
- Explain the impacts of policies



IV. Investigation and analysis: **the meaning of this modification**

□ Strategy on the building of medical facilities

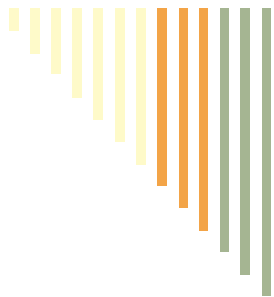




5. Conclusion and discussion

- How we apply this modification
- The prospect of following researches
- Suggestion of a social-share mechanism





Thank you

